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Reports on fires appearing in the Quarterly are copies of or extracts from written reports forwarded to the Association. This Association, as a body, is not responsible for the statements or opinions of any of its members.

The Atlanta Conflagration, May 8, 1908.

Looking southeast from New Terminal Railroad Station. Reading from left to right shows New Terminal Hotel, Post Office "B" and Schlesinger Building in the foreground. Montag Bros.' sprinkler tank can be seen in right background.

The Wool Card and Some Causes of Fires in Card Rooms.

This is a continuation of the paper on Stocks and Preparing Machinery of Certain Textile Mills and Their Hazards which appeared in the January, 1908, issue of the Quarterly, and describes the carding machinery in this class of mills.

It is not the purpose to include the flat top cotton card found in straight cotton mills or the worsted card found in high grade worsted mills, but it is intended to give a general idea of conditions found during working hours in the card rooms of mills using low grade stock, such as mixed cotton, woolen, hair, or low grade cotton.

The subject will be treated as follows:

1st. A description of the wool card and the method of straightening and removing the stock.

2d. The different methods in use for feeding the stock from one card to another with a comparison as to the amount of stock required for each.

3d. The causes of fires at the cards or in the card room and the protection now in use to control same.

4th. Cost of cards and clothing.

The data with the accompanying photographs was secured in mills located in the Middle Eastern States and in all probability does not differ from those of a similar class found in other sections.

THE WOOL CARD.

The wool card is the last preparing machine for stock before it is spun into yarn and will be found in mills working mixed wool and cotton stocks.

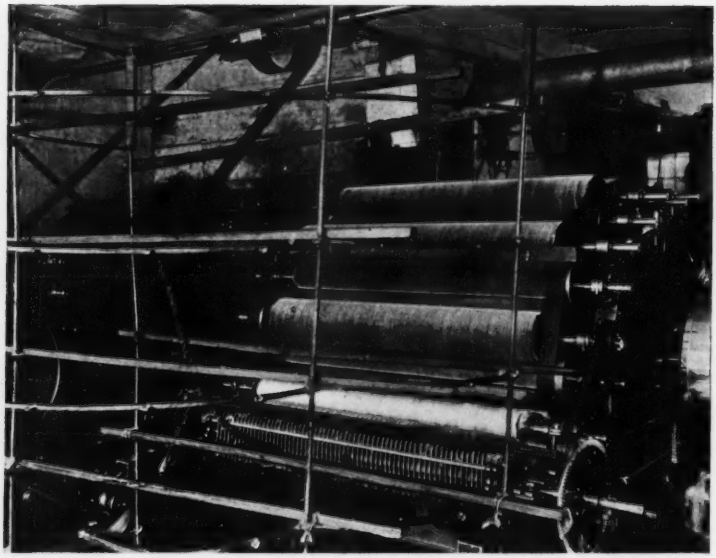
It straightens the stock by a continuous combing process and delivers it in small strands or rovings (slightly rolled to prevent breaking) to long spools to be spun on the mule frames into yarn.

Cards are made from 24″ to 120″ wide. The 48″ and 60″ cards are generally used for preparing yarns; the 24″ cards for wool hat manufacturing, and the 120″ cards for felt manufacturing.

The wool cards are built to suit the ideas of the mill man and may differ in widths, in the number of workers and strippers, the wires of the clothing may be heavier and the rolls be of iron, but the general principle will be the same.

Description of the First Card or Breaker Beginning at the Feed End and Following the Course of the Stock.

Feed Rolls: These are two small metal rolls about 2″ in diameter, placed one above the other and covered with a steel garnet wire fastened in the rolls.



Cut No. 1. This is a photograph of an ordinary 60-inch wool card used as second breaker, showing the feed or back end, the workers, also the strippers which are the small rolls near the main cylinder.

At the back of the card and in its proper position is an empty creel rack, and beyond in the corner can be seen the delivery end of the Bramwell feed for the first breaker card.

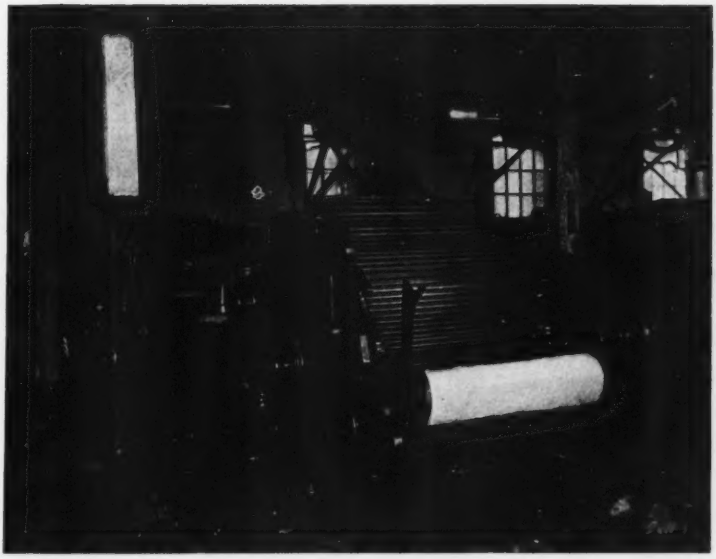
This picture was taken while cards in another part of the room were in operation, working a mixed stock composed mainly of wool shoddy with a small percentage of cotton. This card room is exceptionally well cared for, no flyings about and the machinery is well cared for. Class of help is good and they make a good grade of yarn.

They receive the stock from the feed apron and, revolving slowly in the same surface direction, pass it to the next roll at the rear known as the burring roll.

Burring Roll: This is a metal roll of any given diameter, heavily built and covered with a steel pointed flat top wire. It revolves much faster than the feed rolls, and catches and tears open the hard lumps in the stock which is being firmly held by the slower moving feed rolls. The stock is carried up and over this roll to the tumbler beyond. On some cards just above the top of the roll is a 4″ bladed steel roll, known as the burr guard, this turns in an opposite surface direction to the burr roll.

There is a slight space between the rolls through which the stock passes and any burrs, lumps or foreign particles coming in contact with this rapidly revolving roll, are knocked out of the stock and usually caught on a narrow metal tray located over the feed rolls.

Tumbler: This is located directly beyond and on a line with the "burr roll" from which it receives the stock.



Cut No. 2. This picture was taken in a mill working straight cotton and is intended to show the difference between a flat top cotton card and a wool card. It shows the feed end of the nearest card and the delivery end of the one beyond and to the rear.

It is of wood, 10″ in diameter, covered with a wire clothing and revolves toward the floor, carrying the stock on the under side, to allow any foreign substance to drop from same. The stock is taken from this roll by the "main cylinder."

Main Cylinder: This is usually 48″ in diameter, made of well seasoned wood lagging firmly fastened to a metal spider which is set-screwed to a steel shaft, and covered with a wire clothing. The cylinder is sometimes made of iron but the nature of the clothing varies only in the thickness of the wires.

It moves at a rapid rate, about 85 revolutions per minute, and takes the stock from the strippers and deposits it on the different "workers."

Workers: These are usually 7″ in diameter, made of wood and covered with a wire clothing. They are placed about 12″ apart around the upper half of cylinder. They revolve much slower than the "main cylinder" and turning in the same surface direction catch the unstraightened stock which is being drawn past by the main cylinder.

The stock is removed from the "workers" by the "strippers".

Strippers: These are metal rolls, 2¾″ to 3″ in diameter, located directly in front of the workers and set close to the main cylinder.

They are covered with a wire clothing and make about 380 revolutions per minute, but the surface speed is not nearly as great, due to the difference in circumference. They travel faster than the

workers, taking the stock from same, and pass it to the faster traveling main cylinder.

The stock has received its first straightening by being drawn over the clothing of these rolls, and when again taken by the main cylinder is somewhat straighter and clears the wires of the worker it has just been over, but is caught on that of the next worker, which is set a little closer to the main cylinder.

Here it goes through the same straightening process as on the first worker and stripper and is again removed by the main cylinder and so on over all the workers and strippers, and when removed from the last stripper is well straightened, laying close in among the wires of the main cylinder, and has to be raised by the fancy roll.

Fancy Roll: This is of wood, 10″ in diameter, and covered with a wire clothing having points about three times as long as those on the balance of the rolls. It is located in the same position as the workers and beyond the last one. It revolves in the same surface direction as the main cylinder but at a much greater speed, being the fastest revolving roll on the card. The long wires raise the stock from the foundation to the points of the clothing of the main cylinder so it can be more readily removed by the doffer, which is the next roll.

The fancy roll traveling at such a great speed is liable to heat at the bearings unless given close attention. It also picks up the shorter staples in the stock and, unless provided with a metal cover which fits closely over same "as all cards working on light stock should be," throws the stock about, causing a deposit of light inflammable flyings throughout the room, which is the usual cause of flash fires when ignited.

Doffer Roll: This is a large roll, is 24″ to 30″ in diameter, made of wood and covered with a wire clothing. It revolves in the same surface direction to the main cylinder and at a much slower speed.

The stock is deposited on this roll by the main cylinder and carried around on the under side to be removed by the comb.

Doffer Comb: This is a small flat steel rod extending across and the width of the doffer roll, it has pointed teeth on the under side and moving rapidly up and down combs the stock from the doffer roll.

The stock falls between the doffer and a round tin conical drum, is rolled into a loose roving which is removed at the side of the card frame and wound on spools. This is known as "side drawing."

The roving may be carried over pulleys to the next card which is known as the Apperly feed, or again the stock combed from the doffer may be received on an apron traveling away from the card to be deposited on another apron moving at right angles, which is known as the camel back feed.

The delivery end of the card is known as the front—and the receiving end as the back of the card.

Second Card—Known as Second Breaker.

This is located beyond and on a line with the first breaker, is built on the same plan with the following exceptions, it may have

one less worker and stripper, the feed rolls, also the burr roll which is known as the licker-in on this machine, are covered with a heavy steel wire clothing with leather foundation. There is an additional small roll known as the licker-in fancy, this is 2 13-16″ in diameter, is located on top of the licker-in roll and tumbler and is covered with a long wire clothing to raise the stock on the licker-in so it can be removed by the tumbler. The fancy roll at the rear end of the card is provided with a stripper, similar to the workers.

Dickey: This is a small metal roll about 2 13-16″ in diameter, covered with a wire clothing and is located on top of the doffer, and turning in the same direction clears the doffer of any stock that has passed the comb, by winding it about itself.

Third Card—Known as Finisher or Condenser Card.

This is generally located beyond and on a line with the second breaker, excepting in the case of the camel back feed, when it is alongside and facing in the opposite direction. It differs from the second breaker at the delivery end only, and has two doffer rolls about 12″ in diameter; they are of iron and the clothing is different, being in strips or rings with blank spaces between.

These strips are made of wire clothing similar to the main cylinder clothing; they are ¾″ in width and formed into rings to fit around the doffer roll.

They are fastened to the doffer ¾″ apart, the spaces between are filled in with ¾″ blank strips or foundation of card clothing, having the wires removed.

The rings on the upper doffer are placed opposite the blank spaces of the lower doffer and vice versa, so each ring picks up the same amount of stock clearing the main cylinder.

The end ring of the upper doffer and the one on the opposite end of the lower doffer are usually 1½″ wide to remove the uneven ends.

The same strands are removed from the doffer rings by two small rolls covered with corduroy cloth; the rolls are placed one above the other and turning in opposite directions pass the strands to leather covered rolls or aprons which rub or work the stock into small rounded strands, giving them greater strength to be wound on the spools for spinning.

The two end strands do not go through the rub apron, but fall to the floor after passing between the corduroy rolls, or are wound on a separate spool and worked over again, or sold as waste.

Card Clothing: This is the name given the covering on the main cylinder and rolls of the card already described.

It is made in sheets the length of the cylinder and 4″ and 5″ wide, also in fillets or strips 1″, 1¼″, 1½″ and 2″ in width.

The sheets are generally used on the main cylinder only and the fillets on the other rolls that have clothing.

The foundation or body which holds the wires is made of leather,

rubber or cloth, also a patent cloth foundation known as flexifort which appears to be most used.

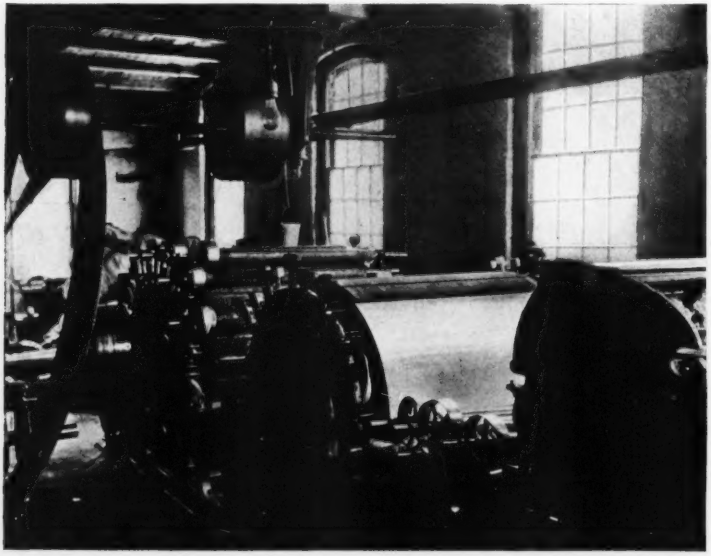
The foundation gives a very rigid hold for the wires. The wires are shaped similar to a double pointed carpet staple with the ends bent over in the same direction at about a 45 degree angle, 5-32 of an inch from the points, forming what is termed a "knee."

The wires are forced through the foundation from the under side, the cross piece being held firmly against the main cylinder by the foundation when tacked on.

The points are arranged in perfect alignment close together pointing one way and in the direction the cylinder or rolls revolve.

To give an idea how close together the points are, the following figures are given. There are 34,560 points to a square foot or 240 per square inch in clothing with No. 28 gauge or a coarse wire and 76,032 per square foot or 528 per square inch with No. 36 gauge wire, which is about the finest used. The heavy wire is used for coarse stock or on the first breakers and the lighter wires gauged according to the stock. Heavy stock worked on light wires would ruin same by bending and disarranging the points.

Sheets of clothing are laid horizontally across the main cylinder (*see Cut No. 3*) and fillet is wound around the rolls, fitting close together resembling a solid sheet.



Cut No. 3. This view shows a wool shoddy card after a fire. The clothing was destroyed and had to be renewed. This is a double cylinder card with a doffer roll between to transfer the stock from one cylinder to the other. The first cylinder has the workers and strippers removed and shows the wood lagging of the main cylinder with a few sheets of new clothing tacked in place.

The clothing is fastened to the wooden cylinders or rolls by metal tacks. The iron cylinders and rolls have holes bored into same, which are plugged with wood and the clothing is tacked to the plugs.

The wires are so arranged that they receive the stock on the points, which are sharp when new, and as the cylinder revolves the stock is drawn further up on the wires against the foundation and take the pull from here.

The points become dulled by use and cleaning, which causes undue breakage of the stock, and have to be sharpened.

Grinding: This is done by a small traveling emery wheel. The clothing of main cylinder and doffer is ground on the card frame and the balance of the rolls on the grinder frame. This frame is known as the floor grinder. It is usually of metal about 9′ long and 4½′ wide; across the top in the center of the frame is a steel screw on which an emery wheel 12″ in diameter and 4″ wide revolves and travels automatically, from one end to the other.

The rolls are placed on the frame alongside of the emery wheel, on one or both sides and turned by belts. The emery wheel traveling back and forth across the face of the clothing keeps the points the same length.

When the wires of the main cylinder and doffer clothing need sharpening the emery wheel is fastened direct to the card frame.

There is a slight danger of sparks being thrown off by the grinding when the emery wheel is set too close against the wires. This danger varies according to the grade of stock and the percentage of cotton being worked.

The writer was present when a grinder was in operation and some flying sparks set fire to the dust on the frame and floor which only smouldered and was easily extinguished.

It would be safer to have the grinding frame in a small enclosed and sprinklered room in the card room. The stock should be removed to a safe distance from the card frame when the main cylinder and doffer clothing is ground, and all precaution taken to cope with any fire that may strike.

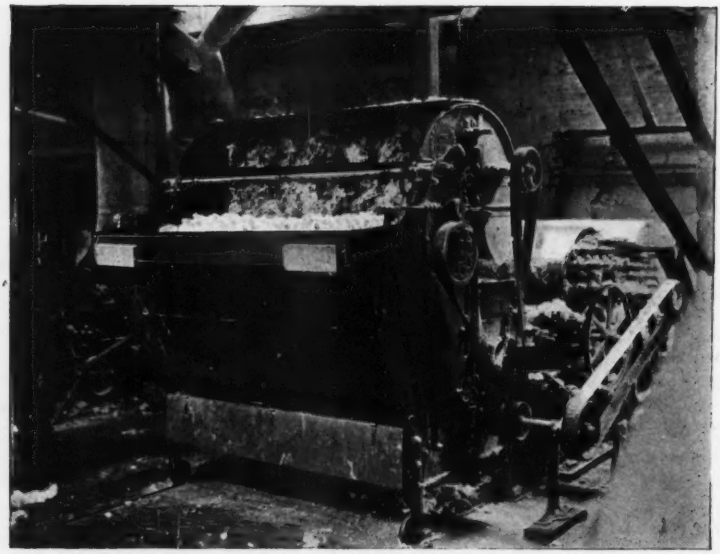
It is found that the mill men thoroughly understand this danger and are usually very careful when grinding is being done.

When the wires wear down so there is only about ⅛ of an inch left beyond the knee the clothing has to be renewed, so it is an easy matter to tell what condition the clothing was in even after a fire.

METHODS OF FEEDING THE DIFFERENT CARDS.

Bramwell Feed: (*See Cut No. 4.*) This is a frame box the width of the card, is raised on legs about 8″ off the floor and stands about 5′ high.

The front or portion facing the card and the sides are straight up and down, while the back inclines outward from the bottom and is much wider at the top. The bottom is open and small metal rods spaced close together prevent the stock from falling out, but any foreign particles can get through. The top is rounded and nearly



Cut No. 4. Bramwell feed. This shows a Bramwell feed in its proper position, filled with stock, also the vertical apron on the inside with stock clinging to the steel points to be carried up and knocked off into the scale beyond. Near the top on the inside can be seen the back of the steel comb. The front part of the cover is thrown back and lays on top of the rounded portion.

covered with a flexible canvas top to which are fastened narrow wood strips. On the inside near the front of the Bramwell feed, in a vertical position, is a continuous canvas apron to which is fastened light wooden strips having sharp steel points about ½" long, protruding and pointing upward at about a 45 degree angle. The vertical apron turns on pulleys, located on shafts at the top and bottom; it moves upwards through the stock, some of which is caught on the steel points and thrown off into a scale by a canvas apron having leather strips fastened on wood, or by a revolving roll located above the vertical apron.

The scale is located on the front side of the Bramwell and over the feed apron of the card. It is an automatic device and regulates the amount of stock for the card to make an even yarn. As the scale opens to deposit the stock on the apron it stops the apron in the Bramwell which starts again when the scale closes.

On the inside of the Bramwell and near the top is a steel comb similar to a doffer comb. This moves slowly up and down, clear of the points of the apron, and prevents any large bunch of stock going over into the scale.

The only chance of a fire starting in the Bramwell feed would be from a match in the stock striking against the steel points or the comb. The steel points of the apron and the comb do not come in

contact, but if they should it would be at such a slow speed that no sparks could be struck.

There is the possibility of stock, which is placed in the feed, containing a smouldering spark from the picker or some other preparing machine, which would be fanned into a blaze by the apron.

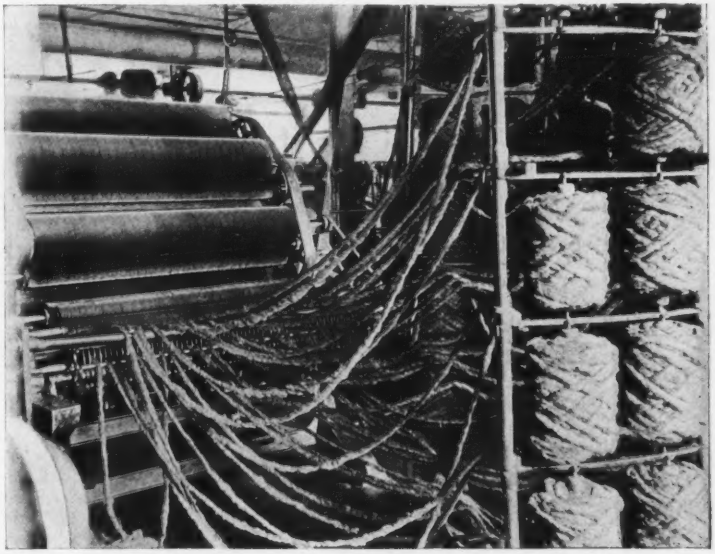
The writer knows of only one instance where a fire originated in a Bramwell feed, but the cause was not definitely known.

A fire can enter the feed through the opening at the floor and lasts so much longer, due to the amount of stock in the Bramwell, it is often claimed it started here.

Creel Feed: (*See Cut No. 5.*) This is used for the second breaker and sometimes for the finisher or condenser card.

It consists of a light, portable, skeleton frame rigid or jointed and in the form of a semi-circle.

It has ribbon irons for the horizontal pieces and wooden sections for the uprights. They are built five and six sections high, each section holds a row of spools.

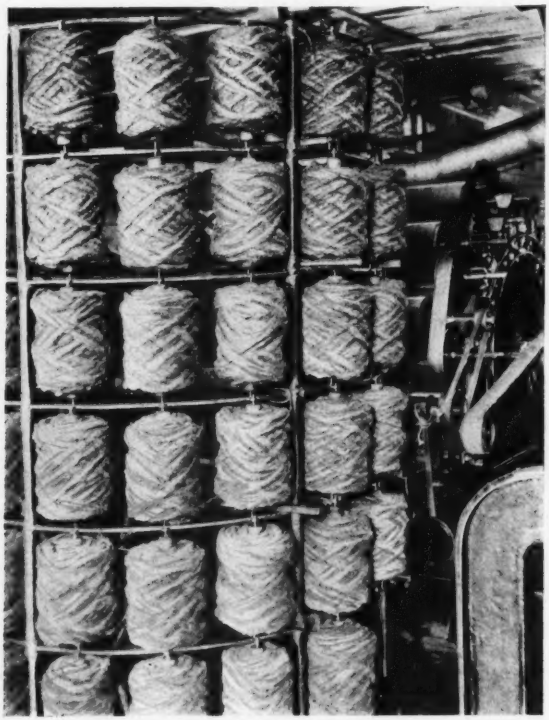


Cut No. 5. This picture was taken in the same card room as Cut No. 1 and shows the method of feeding the stock from the spools on the creel, through the finger rack to the feed rolls beyond. It shows the strands with the twist in them which gives them strength. The end of the creel in the foreground was moved back and away from the card to better show the strands.

The creels are located at the back of the card it feeds with the rounded portion out and away from the card. The ribbon irons have holes drilled in the center and loops or eyes are welded to the outer

edge. The bottom shank of the spools sets in a hole and the upper shank in an eye, this permits the changing of spools independently.

The creels contain 60 to 90 spools when filled and there is generally enough filled spools piled on the floor near the card or creel to replace those in the creel when empty.



Cut No. 6. This picture was taken in the same card room as Cuts Nos. 1 and 5 and shows a full creel of filled spools of stock.

The reserve spools are being continuously filled on the first and sometimes the second breaker card.

A strand from each spool in the creel is fed through a finger rack which is fastened on the back of the card and keeps the strands in their proper places.

The spools turn freely to prevent breaking of the strands by the slight pull of the feed rolls while taking the stock; they unwind independently and are replaced when empty by filled spools.

See Cuts Nos. 6 and 7.

Balling Head: There is another feed similar to the creel known as the balling head which is somewhat of an automatic device where-

Cut No. 7. This picture was taken in a mill working a much lower grade of stock than shown in Cuts Nos. 5 and 6. The mill was working cotton waste and shoddy. The picture shows the delivery or front end of the first breaker in the foreground, the delivery or front end of the second breaker next and the feed or back end of the finisher back of the camel back feed. Note the pile of filled spools of reserve stock for the creel frame.

Care at this mill can be considered fairly good considering the stock worked. No flyings are to be seen on the ceiling, only on the shafting directly over the camel back, but there is a quantity of loose stock on the floor under the card frame; see Cut No. 12 which gives a good idea of how hard it is to confine a short staple stock.

by the stock from the first breaker is wound on spools 3" in diameter and 3" wide and when filled with stock to measure about 12" in diameter they are thrown out automatically into a box and an empty spool falls into position.

The magazine holds 16 empty spools. The filled spools are placed in a straight upright creel and known as the bank creel which holds 90 spools.

These are placed in an upright position resting on the stock and unwound by geared rolls. This method of feeding is not steady; some strands unwind slower than others and break when receiving a slight pull by the feed rolls. The roving on these spools receives less twist than on the side-drawn stock so breaks easier and will not work as short a stock.

Schofield Feed or Camel Back.

This transfers the stock from the breaker to the finisher or condenser card and is generally used with the two set cards.

Cuts Nos. 8 and 9. These pictures were taken in one room and show a two-set mill working hair, wool and little jute into carpet yarns for fillings. No. 8 shows the stock leaving the end of the first breaker and being carried up over the camel back feed and being lapped on the apron of the finisher. Beyond the cards will be seen the small frame stock boxes which receive the stock from the mixing picker through the metal pipes along the ceiling. These boxes are sprinkled and contain a drop door held up by a fusible link. There is one box for each set of cards. There is no light stock here to fly about, but there is considerable stock on the floor between the cards better seen in Cut No. 9.

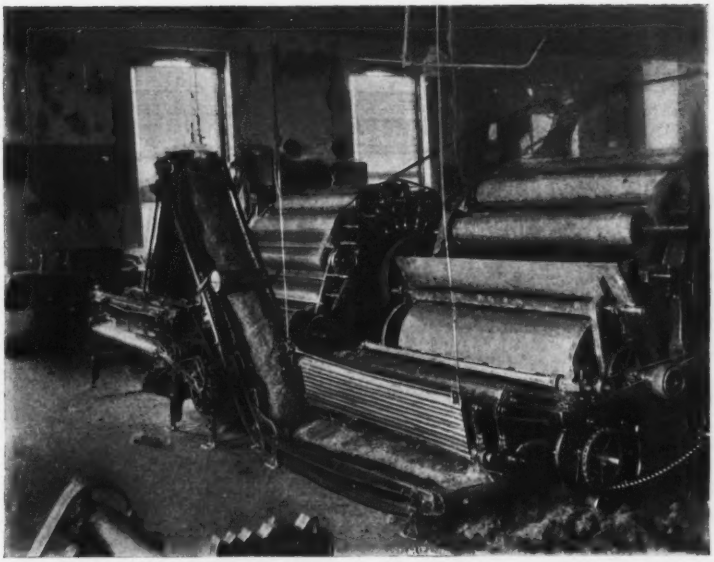
It will work a very short stock, as the process does not require any pulling. The stock when combed from the doffer falls to a continuous canvas apron, traveling away from the card and is deposited on another apron at the rear and moving at right angles to same. This apron is about 14" wide, is continuous and extends across the two cards. The portion at the rear of the condenser card is hinged like a jack-knife which opens and shuts, depositing the stock in layers on an apron at the rear of and attached to the condenser card which carries it to the feed rolls.

This method of feeding requires possibly 5 to 10 lbs. of stock between the two cards.

See Cuts Nos. 8 and 9.

Apperly Feed.

This method of feeding is used either to the second breaker or to the finisher. It is an automatic feed whereby the slightly twisted strand or roving from the breaker passes through two small, plain,



Cut No. 9. This is the same room as Cut No. 8 but shows the manner in which the stock from the first breaker is deposited on the traveling apron of the camel back feed. The fancy roll is not covered but there are no flyings around. This stock does not support combustion.

metal rollers attached to the side and rear of the breaker frame and over two overhead pulleys to be deposited obliquely on the apron of the next card.

This apron is composed of a number of endless strips of canvas about 3" wide of different lengths which move toward the feed rolls. The two outside strips, known as spike straps, are provided with a row of steel teeth pointing upwards to hold the stock taut on the apron while it is being carried on to the feed rolls.

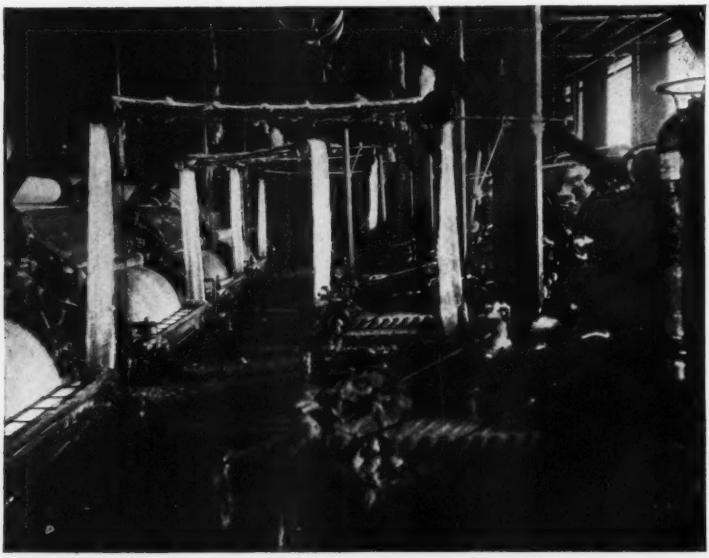
There is a small carriage which travels obliquely across the apron and moving from side to side deposits the stock in rows close together on the apron. The ends where the stock laps are known as knuckles and contain an unequal amount of stock and are the ends that are drawn off as waste on the 1½" doffer rings previously mentioned.

This method of feeding requires the least amount of stock of any, as there is only 3 to 5 lbs. between the two cards.

There is a feed similar to the Apperly known as the Kershaw or "Scoth" feed which delivers the stock in a flat untwisted web about 4" wide, and requires but little more stock.

See Cut No. 10.

The Bramwell feed is used for the first breaker, excepting in some of the oldest establishments, which still have the old machinery and an open feed apron on which the stock is placed by hand.



Cut No. 10. This is a card room showing the Kershaw feed which is the same principle as the Apperly feed. It shows the strands of loose stock being taken from the front of the second breaker and deposited in laps on the apron of the finisher. The fancy rolls of the second breaker are covered and while this is a short staple cotton stock, there are no heavy flyings about. The only means a fire has of communicating from one card to the other is by this strand of stock.

The standard feed for a three card set is the automatic or self-weighing feeder to the first breaker, creel to the second breaker and Apperly to the finisher or condenser card.

The feed for the two card set is usually the camel back feed. Some mills use the creel feed for the second breaker and finisher, others the Apperly to the second breaker and finisher, and in mills where a better grade of carpet yarns is desired the creel is used to the second breaker and the camel back to the finisher.

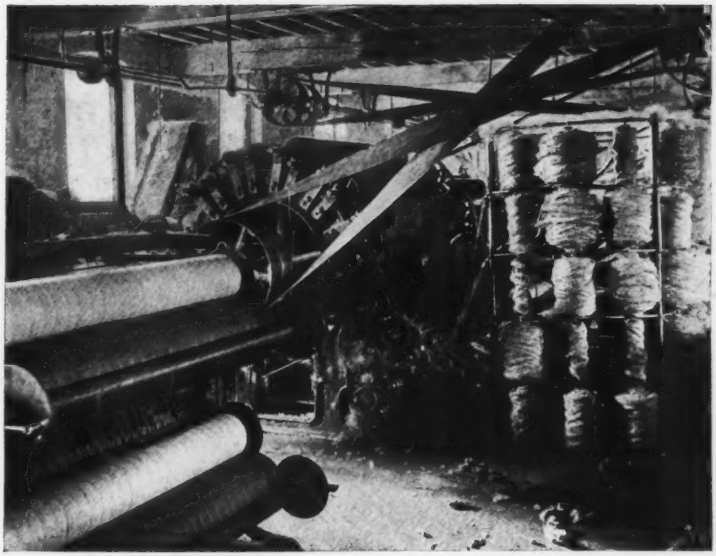
See Cut No. 11.

Of the above feeds the creel by far presents the greatest danger requiring as it does 200 to 300 lbs. of stock on the frame and possibly 200 lbs. more on spools held in reserve and piled on the floor about the card. This gives a total of 400 to 500 lbs. of stock at one card, and almost double that when the creel feed is used for the set.

The Schofield or camel back feed requires 5 to 10 lbs; the Apperly, also the Kershaw, only 3 to 8 lbs. of stock between the cards.

The Bramwell feeds hold 50 to 75 lbs. of stock.

Cards are used two and three to a set. Coarse yarns used for fillings, cheap grade of carpets, etc., or those not requiring a finely spun yarn are prepared on the two-set cards, while those of a better grade



Cut No. 11. This is the same card room as Cuts Nos. 7 and 12. It shows the creel feed to the second breaker, the camel back over near the wall to the finisher and the front of the finisher with the rovings being wound on the spools. Note some of the spools of the creel are nearly empty, others are full. This is done on purpose so an empty spool can be changed without stopping the card. If all the spools ran out at the same time it would be necessary to stop the card and replace the spools. Therefore we cannot figure the amount of stock on a creel as more than two-thirds its capacity.

used for suitings, ingrain carpets, underwear, etc., are prepared on the three-set cards.

CARD ROOM FIRES.

A fire in the card room is generally a difficult one to handle, depending on the kind and amount of stock in the room. Where the creel feeds are used there is always a large amount of stock on spools and a fire here is very hard to extinguish, requiring considerable water and the stock usually has to be thrown out and fully opened up before the fire is entirely out.

It can readily be seen why the location of the card room (such as over the stock or finishing room of a mill, or over some tenant with a valuable stock), the kind of stock used and the method of feeding the different cards should be considered in each risk.

Following are some of the known causes of fires that have started in the card room.

The main cause of fires in the card rooms are foreign substances, such as matches and pieces of metal in the stock striking sparks on the metallic licker-in roll of the first breaker.

Matches are undoubtedly the cause of the greatest number of fires as they will not go over the card without striking, while pieces of steel and other metallic particles have been known to pass the licker-in roll without striking and have fallen to the floor from the tumbler.

There is a possibility of the bearings of the fancy roll heating and igniting the light flyings which accumulate on same. This danger has been eliminated to some extent by the use of sleeve bearings.

The pulley used for regulating the belt for the smaller rolls and located near the floor at the inner side of the card, has been seen to throw off sparks caused by friction due to the accumulation of stock.

Open gas jets, the blowing out of an open fuse block and open knife switches in the room have been the cause of numerous fires.

Fires have been blown from the picker to the stock boxes in the card room. Old standard electric lighting systems with light double twisted wires and metal socket lamps have also caused fires by the strands of the wires breaking and arcing on the lamp socket and cord.

The class of mills having the greatest number of fires are usually those making the cheaper grade of goods, using shoddy and low grade cotton stocks. They employ the cheapest class of help and some mills speed their machinery much faster than it is intended to run, the main cylinder making as high as 100 and 120 revolutions per minute and the other rolls in proportion. This not only increases the danger of overheating the bearings, but causes much heavier flyings throughout the room.

See Cut No. 12.

The wool card and the clothing are very susceptible to water damage. The wood lagging of the cylinder and the other wooden rolls swell and warp, throwing the points of the wires out of true.

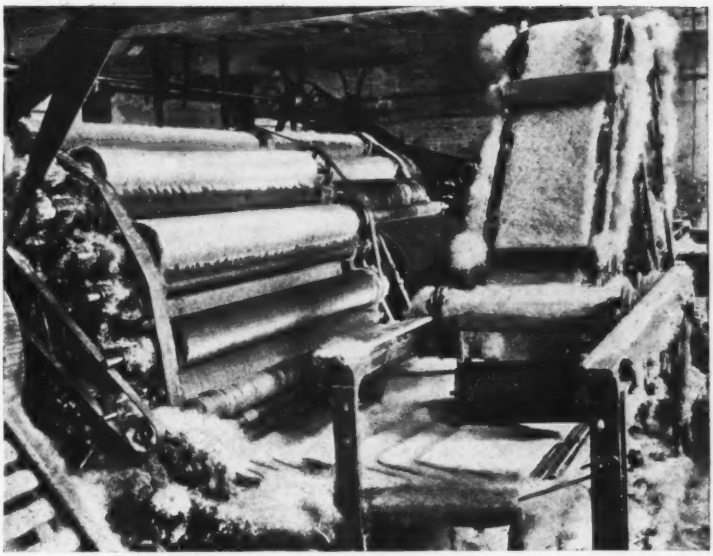
The wires of the clothing rust where they pass through the foundation; this does not show up after a light wetting, but the action of the rust continues until they eventually break off. The cards that work on oiled stock will stand considerable more wetting than those working stock not oiled, as the foundation and the wood lagging become saturated with oil and throw off the water when started up again.

The cheaper the grade of stock worked the lower the grade of oil used, varying from lard oil to petroleum oil. The oil is used for several reasons, the principal ones are for softening the stock, keeping down the fly and the addition of weight. The oil has to be removed before the stock can be dyed, so in mills where they work up their own waste there will not be as much oil used as in the mill that prepares stock for others.

Mill men have different ways of treating the cards after a fire. They all keep the cards running as fast as possible, some stock over same to absorb the water, others apply oil by means of the hand card, while still others apply whiting which absorbs the moisture.

The Protection of the Card Rooms.

Considerable time has been given by Fire Insurance Engineers and mill men to devise some means within reason for confining a



Cut No. 12. This photograph is from a mill making carpet yarns for filling from short staple cotton stock. It shows the delivery end of the camel back as it deposits the stock onto the apron of the finisher. The fancy roll of the second breaker is not covered, there is no oil used on this stock, and the flyings are very heavy on the card frame and about the floor, but none on the shafting or ceiling away from the card. This mill has been very free from fires, due presumably to the class of help, but a fire here would spread over a considerable area and open a large number of sprinklers.

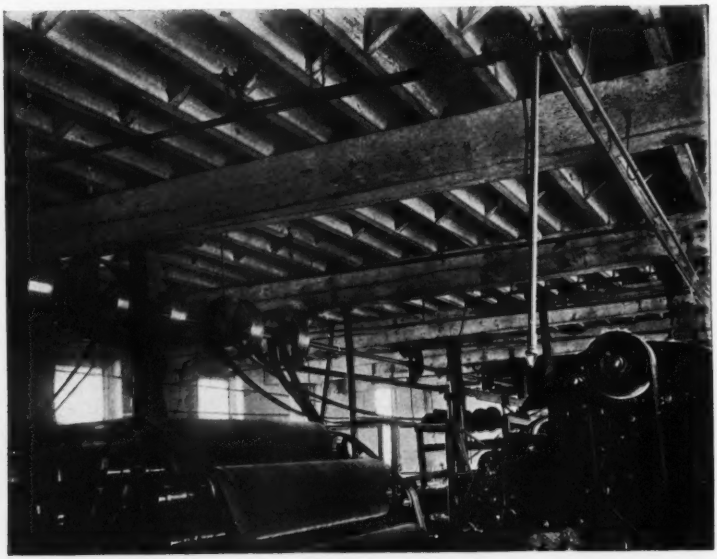
fire and the accompanying water damage to as small an area as possible. The outcome has been to place additional sprinklers nearer the main body of stock, i. e. inside the Bramwell feed and over the feed apron of the first card, with the idea that the lower sprinklers will operate first and cool the atmosphere and prevent the ceiling sprinklers opening in a small fire.

In some mills a sprinkler is placed under the hood of the Bramwell and one over the feed rolls of the first breaker. Others in the Bramwell and under the feed apron of the first breaker, while still others have a sprinkler inside the Bramwell and outside of same under the scale to prevent a fire traveling back over the stock from the licker-in rolls and entering the top of the Bramwell. This method would not prevent a fire travelling over the card or along the floor into the Bramwell from the bottom.

When a fire strikes on the licker-in roll it is only a slight spark, until it gets into the light stock on the floor or that which is going over the card.

Writer has in mind one mill (*see Cut No. 13*) that has a sprinkler located about 18″ above the top of the Bramwell feed and over the

Cut No. 13.



Cut No. 14.

vertical apron. This had a round funnel-shaped tin hood placed over same which not only protects the sprinklers from being wet down by the ceiling sprinklers but is also intended to concentrate the heat making the sprinkler operate quicker.

The top of the Bramwell feed is removed excepting for a few slats over the scale, so this sprinkler can well protect the stock in the Bramwell, also that on the feed apron and the lower part of the feed end of the first breaker. Directly over the first breaker and near the ceiling is located an opened sprinkler controlled by a quick opening valve, operated by a lever just high enough to be out of the way but within easy reach. These two sprinklers are on a 1″ branch pipe with a gate valve in same and are piped from the ceiling. For a fire traveling over the card, the lever controlling the quick opening valve can be operated much quicker than one could get a pail of water or a line of hose. If the fire were in the Bramwell or on the apron the ordinary sprinkler would take care of it and the opened sprinkler need not be used. This also allows of a quick shutting off of these heads without cutting off the ceiling sprinklers on the main system in the room.

As the smaller rolls of the card have to be removed frequently and are often carried back over the Bramwell feed, the method of piping down from the ceiling for these extra sprinklers is objected to by the mill man. It will then be necessary to pipe up from the floor for sprinklers inside the Bramwells, or near the apron.

Writer is of the opinion that sprinklers placed as described and shown in Cuts Nos. 13 and 14 with a good supply of approved three gallon chemical extinguishers or small hand hose in addition to the ceiling sprinklers is the best protection for the card room using the low grade highly inflammable stock, or where over 50% of cotton is being worked.

There should be a floor valve of an outside stem and yoke pattern to control the card room sprinklers in addition to the valve at the base of the riser or the post indicator gate valve in the yard.

COST OF NEW CARDS COMPLETE AND NEW CLOTHING.

3 set 48″x48″ cards, wooden cylinders, leather backed clothing, Bramwell to the first breaker, creel to the second breaker and Apperly to the finisher with rub rolls,	$2,844.00	
Same cards with iron cylinders cost,	267.00	more
3 set 48″x60″ cards, same as the above,	3,200.00	
With all iron cylinders,	297.00	more
3 set 48″x60″ cards, similar to the above but with Bramwell to the first breaker, creel to the second breaker and finisher,	2,939	
With all iron cylinders,	297.00	more
2 set 48″x48″ cards, wooden rolls, Bramwell feed to the first breaker and camel back to the finisher with apron rub with "flexifort" clothing,	1,895.00	
With all iron cylinders,	169.00	more
2 set 48″x60″ cards, same as the above,	2,124.00	
All iron rolls,	187.00	more
Note:—The above prices do not include driving belts.		
Reclothing for set of 3 cards 48″x60″ leather foundation,	901.00	
Reclothing for set of 3 cards double covered "flexifort,"	823.00	
Reclothing for set of 3 cards 48″x48″ leather foundation,	720.80	
Reclothing for set of 3 cards double covered "flexifort,"	658.40	
Bramwell feeds complete 60″,	250.00	
Bramwell feeds complete 48″,	220.00	

Note:— The above prices were given by a large manufacturer of textile machinery.

WM. H. FISHER, *Inspector,*
The Underwriters' Bureau of The Middle and Southern States.

Fig. 1. General view of conflagration from the northwest, about 11.30 a. m.

The Chelsea Conflagration.

The following is reprinted from a report on the conflagration of April 12, 1908, made by Gorham Dana, Manager, Winthrop P. Tenney, Benjamin Richards, John W. Chapman, Inspectors of the Underwriters' Bureau of New England. This report is copyrighted by the Bureau and this reprint of certain portions of the report is made with their permission.

On Sunday, April 12, 1908, Chelsea, Mass., was visited by a conflagration which destroyed approximately one-half the improved area of the City. About thirty-five hundred buildings were burned, covering an area of nearly two hundred and seventy-five acres. Up to the present time, eighteen persons are known to have perished and it is believed that the total loss will prove to be over twenty lives. The monetary loss was some twelve millions of dollars and the insurance loss was a little over nine millions.

This report seeks to give an accurate account of the underlying causes that made such a catastrophe possible, to trace the development of the fire from inception to control and to draw conclusions which it is hoped will be of value. Students of fire protection engineering will find in the Chelsea fire little of scientific interest but municipal authorities might profit by the lessons it teaches.

DESCRIPTION OF THE CITY.

At the time of the fire, Chelsea was a city of about thirty-eight thousand inhabitants of which probably one-third were of foreign extraction. It had the regular city form of government, mayor, aldermen and the various municipal departments. During recent years, many influential citizens of means had moved away and the foreign element of low moral stamina and small earning capacity had steadily increased. Property had decreased in valuation. The city had been loaded down with heavy municipal expenses and tax returns were decreasing. The tax rate had increased. Chelsea had slowly deteriorated. A policy of the utmost economy was required. The municipal departments most necessary for protection against the danger of conflagration, the Fire, Building and Water Departments, were handicapped. Money actually needed for improvements was diverted to other channels. The maintenance and organization of these departments had not kept pace with the growth of the city.

All this time, the "rag district" had been increasing rapidly in area, number of buildings and population. Prominent rag dealers from all sections of the country were attracted to Chelsea until at the time of the conflagration it was the rag centre of this part of the country. There were in this "rag district," bounded by the railroad, Arlington and Williams Streets, about two hundred rag and junk collectors and dealers. There were probably at least fifty rag shops. Rag and junk collectors and dealers were required to have licenses but none were required for rag shops. In certain streets, nearly every shed, stable and yard contained rags. Vacant stretches of land were utilized for drying purposes, the rags being spread out all over the ground. Rags were even dried on lines in back yards. It seems as if little serious attempt was made to properly supervise these rag dealers in their pursuit of a livelihood, and by playing the game of politics they did about as they chose. The consequence was that the district was a conflagration breeder of the worst kind. That these conditions were fully understood by the City officials and department heads it is only necessary to quote Mayor Willard's reference to the "rag district" in a report as long ago as January 1, 1907. He said, "When we consider that at any time with a high wind prevailing, a fire might gain such headway as to get beyond control * * * * and would destroy property worth many thousands of dollars, we realize that the cost does not enter into it as much as the protection of the property." Chelsea openly acknowledged a deplorable condition of affairs and yet nothing was done to improve it.

CHARACTER AND OCCUPANCY OF THE BUILDINGS.

The "rag district" where the fire obtained its tremendous start was covered with small one to three-story frame buildings and shanties occupied principally as dwellings, stables and sheds, interspersed with two and three-story rag shops, tenements and junk shops. Here and there long rows of brick and frame dwellings extended up into the heart of the city. A large part of the buildings were of the cheapest and flimsiest construction. Approaching the business section, brick buildings predominated and on Broadway, the business centre, the buildings averaged higher and the con-

struction, while better than in the outlying districts, was, on the whole, rather poor. These buildings were mostly two and three stories in height, very few being as high as four stories. Sheds and other frame structures extended close up to the rear of the unprotected Broadway buildings. Brick churches, schools, city buildings and frame synagogues were located throughout the entire area, some with considerable open space about them. This space proved entirely ineffective in stopping the progress of the fire. The centre of the city was, as a whole, closely built up and frame buildings predominated.

There were no fire resisting buildings throughout the burned area. The nearest approach to this seen was the building occupied by the Chelsea Trust Co. While not in any sense fire resisting, its walls were very nearly blank toward the conflagration and the bricks well laid and bonded. This building received a heavy part of the conflagration and although the interior was completely burned, the walls successfully withstood the flames, doubtless serving to some extent to prevent further progress of the fire to the southeast.

Beyond Broadway, on Bellingham Hill and vicinity, many of the dwellings, which occupied this section almost exclusively, were of an old type of two and one-half-story cottage house. The frame ones had pitch shingle roofs while many of the brick ones had outside accessory woodwork. Probably seventy-five per cent. of this section was of frame construction. On the outskirts of this part but more widely separated and skirting the water front were several specially hazardous occupancies such as oil and varnish works and a lampblack and stain factory.

Viewed as a whole, structural conditions in the conflagration area were very poor, the buildings being mostly of wood with many concealed spaces, inflammable roofs, boxed cornices and a notable lack of parapet walls and protected windows.

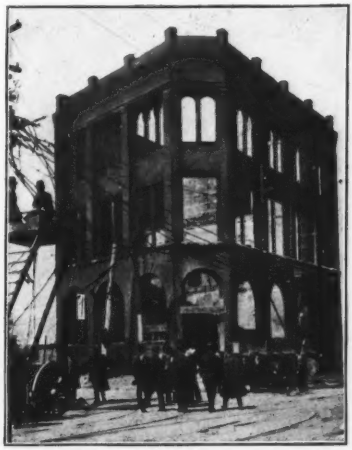


Fig. 2. The Chelsea Trust Co. Building.

FIRE DEPARTMENT AND WATER SUPPLY.

The Chelsea Fire Department consisted of twenty-one permanent and fifty-seven call men divided into seven companies. There were three steamers and one chemical engine with hose and the ordinary equipment. All the apparatus responded to a second alarm. There were numerous cities and towns within a radius of ten miles that could give aid in case of serious fire. There had been numerous fires in the "rag district" and the dangers of the locality were well understood. Soon after the fire was discovered, aid was summoned from Boston, Somerville, Cambridge, Malden, Melrose, Everett, Wakefield, Quincy, Newton, Revere and Lynn. In all, about thirty engines were in service during the fire.

The water supply was quite satisfactory for a city of this size. The normal pressure was about fifty pounds in the business section and the feed mains were of liberal size. There was a fair supply of hydrants, generally four to six hundred feet apart. Some of the newer portions of the "rag district" lacked hydrants but in other portions, hydrants were two hunded feet apart.

The details of the water supply will be described under a separate heading.

Fig. 3. Rag pile where fire started, in foreground Boston Blacking Co. buildings at left, Hecla Compress Gas. Co. on right. Looking east.

CAUSES OF THE CONFLAGRATION.

The ignition of rags and waste in the rear of Second Street near the corner of Carter Street first started the fire. This section of the town at the extreme west was mostly open wet land in process of filling. The

usual dumps and numerous rag shops were in evidence. There were great piles of cotton and yarn waste, also woolen rags spread over the ground to dry. It some way unknown, these were ignited, causing a smouldering fire which had probably been burning some time. The wind, which was very high, was unusually severe in this locality owing to the open stretch of flat country extending over the marshes toward Everett. The burning rags were blown against the "McKay" wax shop of the Boston Blacking Co. about two hundred feet distant, and set fire to it. Rags drying in the vacant space east of the Hecla Compress Gas Co.'s buildings next took fire and ten or fifteen minutes later the fire broke out in a large pile of rags inside Lewitsky's rag yard about nine hundred feet to the southeast of the blacking factory. It was at Lewitsky's and Rosenfield's rag shops adjoining each other on Third, Elm and Maple Streets, that the conflagration really started.

The fires in the Boston Blacking Co.'s building and in the vacant space east of the Hecla Compressed Gas Co.'s factory undoubtedly were due to rags or sparks from the original fire but there is some doubt as to whether the fire in Lewitsky's yard and building can be attributed to this cause. Incendiarism is openly charged and there are too many of these reports to doubt that in part they have some real foundation. The State Police are now investigating the matter. Burning rags may have been blown by the wind to Lewitsky's yard, if so, they must have passed over an enclosure containing tar paper storage and a two-story frame laundry on Maple Street.

The wind was very severe on this day; were it not for this fact the fire undoubtedly would have been controlled in its early stages. The maximum velocity of the wind at 9 o'clock was twenty-six miles an hour as recorded by the United States Weather Bureau at Boston. This had increased to thirty-six miles as a maximum at 1 o'clock. It is possible that on account of the configuration of the land on each side of Chelsea the severity may have been somewhat greater here, for a wind of twenty-six to thirty-six miles an hour is not extraordinary for this section. These conditions, together with the poor construction and hazardous occupancy of this section of the city were the principal causes for the fire getting beyond control.

STORY OF THE FIRE.

The fire started sometime after 10.30. First alarm was sounded at 10.45. The Fire Department on arriving proceeded leisurely to put a stream on the waste which was burning slowly, for the fire was then not at all serious. In about five minutes they noticed that the side of the Boston Blacking Co.'s building was also on fire and a second alarm was sounded at 10.55. This was more as a precautionary measure because of the high wind and the knowledge of the large amount of naphtha and rosin stored inside the yard. The Chief went at once to the Blacking Co.'s buildings and in about ten minutes had the fire well in hand. Some one then came to him with the story that the rags in Lewitsky's yard on the corner of Maple and Elm Streets, about nine hundred feet from the Boston Blacking Co.'s buildings, were on fire. He despatched his chemical engine to this new fire. On arriving, the chemical man saw a brisk blaze in these rags, which were heaped up beside the rag shop. He was making progress and just considered that the blaze was practically under control when, to

his surprise, the fire flashed through the office inside the main building. Understanding the seriousness of this, he sent word to the Chief that this building was on fire inside and without waiting to investigate, the Chief sent a special call to Boston for two steamers. This was received at 11.25. Then rapidly followed telephone calls to Boston and neighboring towns for all the help possible. About twenty-five engines responded up to 1 o'clock.

Meanwhile, driven by the high wind, the fire rapidly spread throughout Lewitsky's and Rosenfield's rag shops, both three-story frame structures, and by the time the first Boston engine arrived, possibly 11.30, was well on its way to Arlington Street. It swept through the small frame buildings in these blocks with extraordinary rapidity passing onward by

Fig. 4. View across Broadway Square about 4 p. m. during fire.

leaps and bounds, picking out shingle roofs and obtaining a foothold on porches and buildings far ahead. The panic of the inhabitants who sought to remove their furniture and bedding to places of safety also helped in no small degree the spread of the fire. Many loads of furniture took fire in the streets as did that stored on sidewalks and parks.

The Chief had requested the Boston engines on arriving to rally on Arlington Street where he hoped that several brick buildings would serve to check the flames. When the engines arrived, the fire had already passed the street in places and was making great strides toward Broadway. It seemed impossible to stay its progress and the engines no sooner got in front of it than their position became untenable. By 12 o'clock it was passing Broadway near the junction of Washington Avenue and here a partial rally was made but nothing was gained and an engine had to be abandoned. By 12.30 it had crossed Broadway in many places and frame houses and sheds even as far in advance as Shawmut and Congress Ave-

nues were on fire. It leaped whole blocks, reaching the American Circular Loom Co. at 12.45 and while it had not yet reached Bellingham Hill it was rapidly encircling the Garden Cemetery on both sides. The fire was beyond control. From then on, it was a continual falling back by the fighters on the flanks, to Marlboro and Sixth Streets, and finally to the railroad gap on the north; and to Third, Congress, Essex and Suffolk Streets on the south. The fire extended so rapidly that many of the buildings in the residential section burned without any effort being made to save them. The extreme easterly section was sparsely covered and it was hoped for this reason that the specially hazardous buildings on lower Marginal Street and Eastern Avenue could be saved. The shower of sparks, pieces

Fig. 5. View in Marginal Street opposite Magee Furnace Co. showing smoke from oil plants.

of wood, parts of buildings and the contents, all blazing, were carried by the wind far ahead. They settled down on the manufacturing plants, oil plants and East Boston buildings setting fire wherever they struck. Six Boston engines and the fire boat fell back on the East Boston shore and succeeded in putting out many roof fires. The Valvoline Oil Works in Chelsea caught about 1 o'clock. This plant contained kerosene oil, naphtha and machine oils; several explosions took place. The Stickney Tirrell Co. burned about 2 o'clock and the Tide Water Oil Co. about 2.30. Soon one of the tanks belonging to the latter company exploded, throwing a shower of burning oil over to the East Boston side of the trolley and railroad bridges and the Metropolitan Sewerage Pumping Station. These immediately took fire.

In the meantime, a creosote oil barge near Green's ship yard and the Samuel Cabot Co. factory became ignited. The burning oil passed under the wharf of the Samuel Cabot Co. Works and ignited it but the factory

already had caught at the front, about 2 o'clock, from flying embers. Chelsea Creek was now covered with burning oil which was carried by an incoming tide up to the bridges and over to the wharves of the Standard Oil Co. on the East Boston side. The fire boat was hemmed in by burning oil but passed through it by directing its stream on the oil and making a passage for itself. The main buildings of the Standard Oil Co. caught from its wharves about 6 p. m. and were totally destroyed.

Thus in seven hours a stretch of land a mile and a half long and half a mile wide had been completely burned over.

On the whole, the fire seems to have been fairly well fought especially in certain sections. It is not strange that under the stress and excitement of a large conflagration many mistakes were made. If the entire energies of the department had been transferred to Lewitsky's rag shop after it was discovered to be on fire the results might have been different, for the Blacking factory was so isolated, that the fire there could hardly have menaced the city as a whole. A better trained and better managed department would have undoubtedly prevented much damage and might have saved the city in the early stages of the fire; but no department could probably have prevented the fire spreading to the water front after it had once attained the proportions of a conflagration.

DETAILS OF THE CHELSEA WATER SUPPLY.

Chelsea is in the Metropolitan water district, receiving its water from the same source as does Boston. The city owns and maintains its own mains, the Metropolitan water being delivered into their system through several connections, some of which are ordinarily kept shut.

The system is divided into two levels, a high and a low, the former supplying mostly the residential district in the easterly part of the city. There is a high service reservoir, capacity one million gallons, kept full by automatic valves from a sixteen-inch pipe, supplied by the Metropolitan twenty-inch main, entering the city by the north. This reservoir was formerly kept full by pumps located near the centre of the city draughting from the low service, but this station had not been used for several years and it was destroyed by the fire. Pressures on the high service system run from fifteen to seventy-five pounds.

The low service district includes about two-thirds of the city. It is supplied directly from the Metropolitan feeders at a pressure averaging about fifty pounds. A forty-two-inch main enters the city from the northwest and connects to the Chelsea mains near the city line and also in Broadway. The first connection is ordinarily kept closed. The Broadway connection is through a ten-inch Venturi meter with an extra twenty-inch connection kept shut off. Water also is available from closed connections in Marginal Street and a connection from the twenty-inch main to Charlestown; but ordinarily, to equalize the pressures, the current of water is from Chelsea into Charlestown. During the heavy draught of this fire, however, this current was reversed and Chelsea was fed also from Charlestown through the twenty-inch main supplied farther back by twenty-four and thirty-inch pipes. No water is available from East Boston, the current in their mains being always from Chelsea.

There are also four connections between the high and low services which are ordinarily kept shut.

Early in the fire, as an extra precaution, the Superintendent of the Water Works opened the twelve-inch valve in the connection from the forty-two-inch Metropolitan main near the city line on the northwest. This was not long after 11 o'clock. He then opened the sixteen-inch valve near the reservoir, letting the Metropolitan high service directly into the Chelsea high service. He shut off the reservoir thinking that it might overflow, as normally the Metropolitan high service gives thirty pounds at the reservoir level. The eight-inch valve in Broadway separating the high from the low and also a similar six-inch valve, corner of Crescent Avenue and Washington Avenue were opened. Thus early in the fire, the Chelsea mains were well supplied, the high and low services working together and both backed up by liberal sized Metropolitan mains. The officials of the Metropolitan Board were in touch with the conditions and by 2 o'clock had opened the connection in Broadway letting in the full capacity of the twenty-inch main from Charlestown. The twenty-four-inch connection to the East Boston supplies was also opened.

Fig. 6. General view of Bellingham Hill showing ruins of Highland School.

The records of the Metropolitan Water Board show that the pressure in their main feeders in Chelsea did not drop more than twenty pounds below normal during the fire. We also find that no steamers in East Boston were in distress for lack of water and East Boston is entirely supplied from Chelsea. Any shortage of water occurring must have been due entirely to the heavy draught placed on the Chelsea pipes. We find a few cases where a steamer was temporarily unable to obtain water and several engineers report that the flexible suctions had to be replaced with stiff ones, the water being taken under a slight lift. Occasionally, steamers raced or were otherwise troubled with air in the suction but these cases are probably due entirely to local conditions. Steamers located on the principal streets found the supply adequate although the waste must have been large. The Chief Engineer of the Metropolitan Water Board estimates the consump-

tion of water during the fire to be about twenty million gallons. This estimate is based on the pump and meter records.

In general, good judgment was shown by those in charge of the water supplies. There was no need of shutting off the reservoir as the demand for water was so great that it could not have overflowed but as this would probably have made no difference in the final result, this error of judgment is not important.

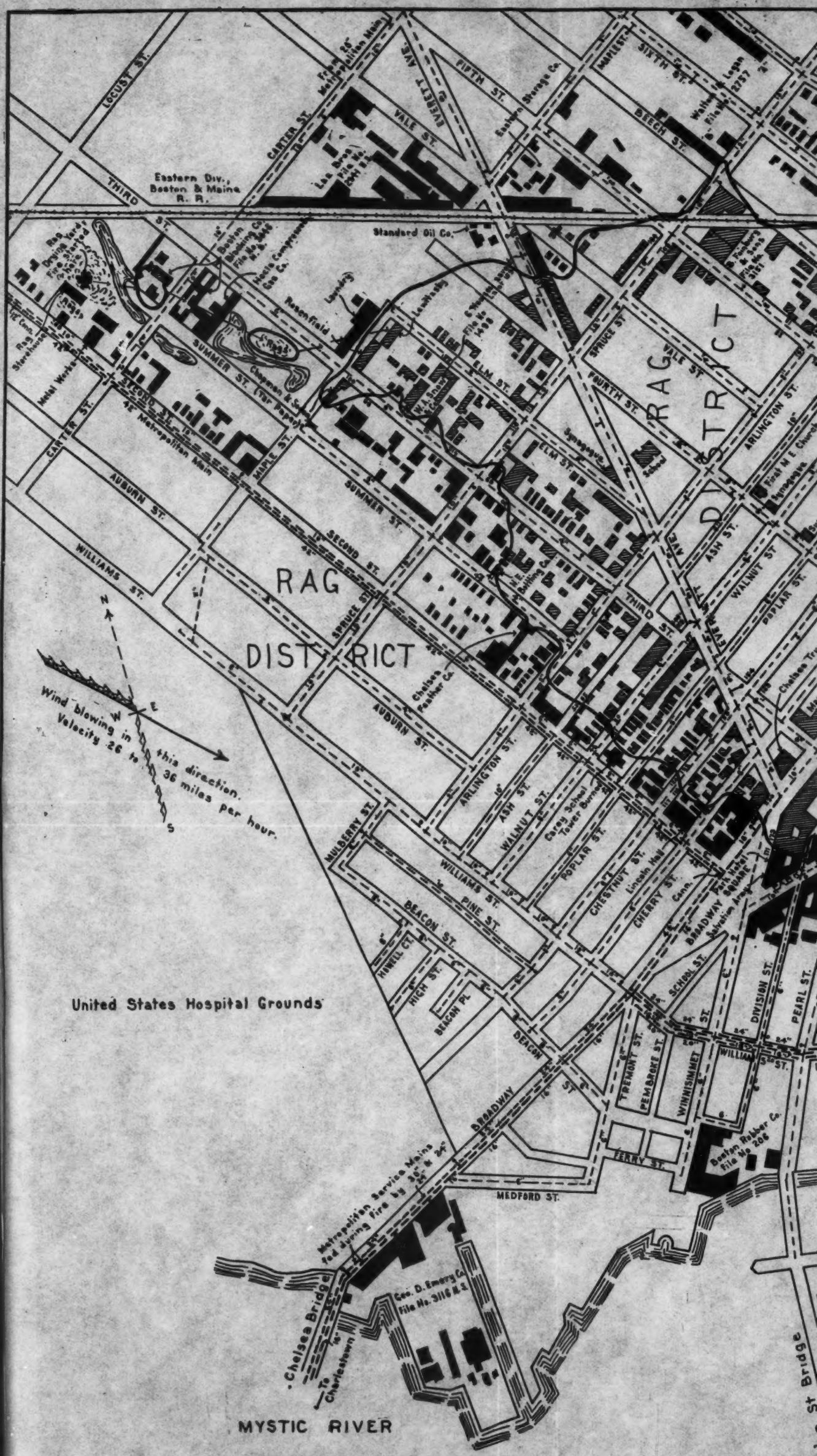
CONCLUSIONS.

The most notable facts which this fire emphasizes are as follows:

1. The dangerous nature of pitch or mansard shingle roofs, frame porches, piazzas and accessory woodwork in spreading a conflagration.
2. The complete failure of any roof supported by unprotected steel or iron to withstand any but the smallest fire.
3. The need of good window protection where the sweep of the flames is parallel to division walls and the necessity of blank walls or properly protected window openings and parapet walls at right angles to prevailing winds.
4. The vulnerability of any ordinary buildings to sparks and embers, provided the bombardment be long enough, even though the space separating them from the burning buildings is great.
5. The slight value of streets of ordinary width in holding a fire when there is strong wind blowing and the fighting force is scattered.
6. That the safest way to store oil in large quantities is in well made boiler iron riveted tanks having covers of the same material with large automatic relief valve, all well supported on brick or concrete piers.
7. That Municipalities cannot violate the laws of good construction and fire protection without inviting conflagration.
8. That the Metropolitan Water Works system is shown to be exceeding valuable for cities which it serves as it successfully withstood the extraordinary draught caused by this conflagration, although the Chelsea mains were not adequate in size nor properly gridironed.
9. That more co-operation is needed between city officials and insurance interests in regard to protection against fire.

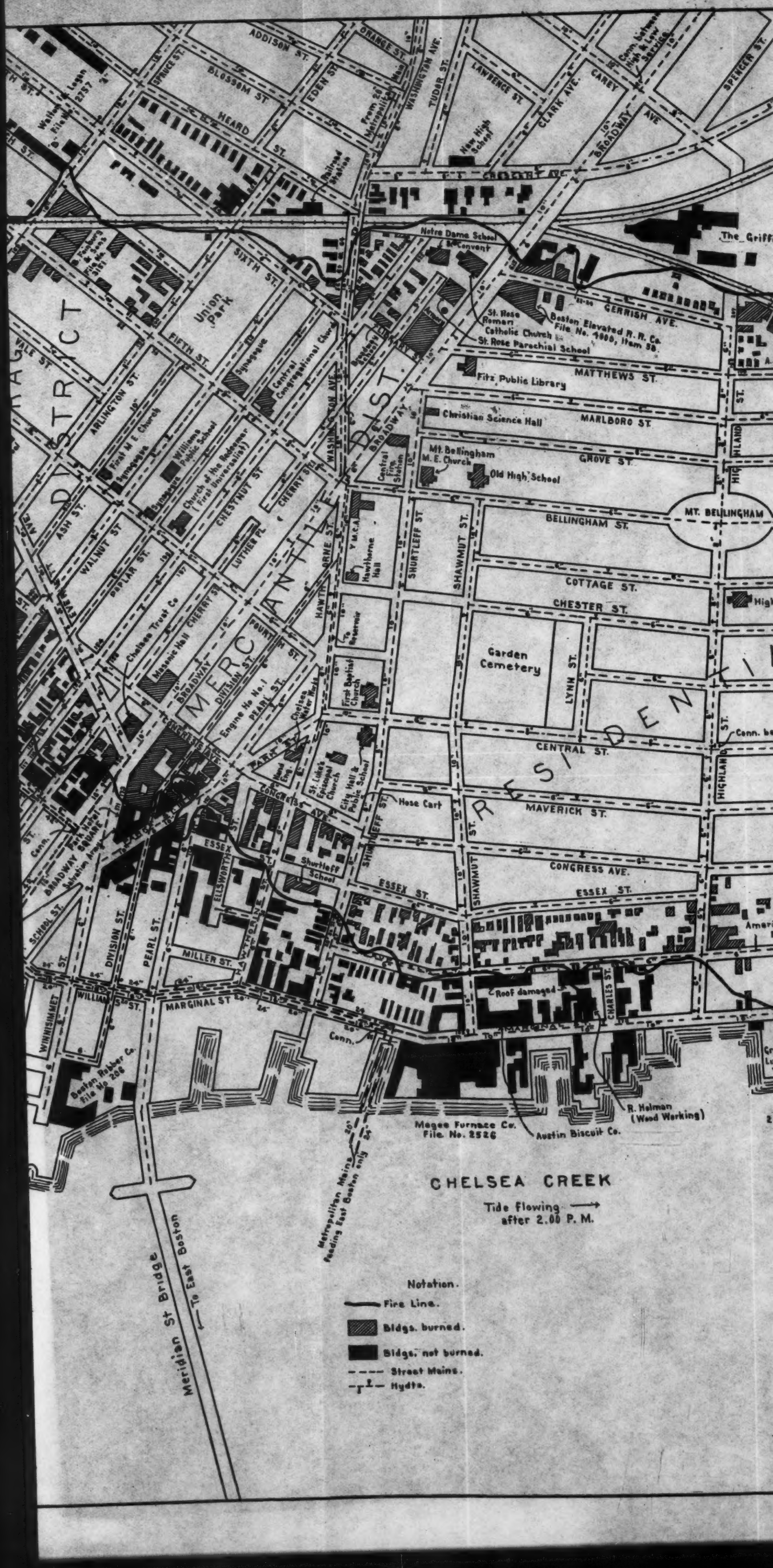
Chelsea cannot be considered blameless for this conflagration. The officials fully realized the conditions. Both water board and fire department had asked for improvements but the Aldermen refused to grant appropriations. Fire protection that is originally ample should keep pace with changed conditions in cities and almost invariably cities fail to recognize these changed conditions. In the case of Chelsea, however, it proved to be not so much defective water works and fire department as inadequate building laws poorly enforced, and the admittance of an irresponsible foreign population supposed to be favorably inclined to incendiarism.

The attitude adopted by water boards, not only of Chelsea but of other cities, should not be passed over. We refer to the constant combating of advanced fire protection ideas affecting private fire service pipe, and the requiring of meters on fire service connections, thus discouraging automatic sprinkler protection. Economy in the use of water is their one cry and they bend every effort in that direction. No argument is necessary beyond pointing out our enormous annual fire losses to show both the weakness of


LOCUST ST.
THIRD ST.
Eastern Div., Boston & Maine R. R.
CARTER ST.
VALE ST.
EVERETT AVE
FIFTH ST.
Eastern Storage Co.
MAPLE ST.
SIXTH ST.
BEECH ST.
Standard Oil Co.
Rosenfield
SUMMER ST. (Tar Paper)
SECOND ST.
MAPLE ST.
SPRUCE ST.
ELM ST.
FOURTH ST.
RAG DISTRICT
ARLINGTON ST.
AUBURN ST.
SUMMER ST.
WILLIAMS ST.
RAG DISTRICT
ASH ST.
WALNUT ST.
POPLAR ST.
THIRD ST.
Chelsea Feather Co.
MULBERRY ST.
BEACON ST.
PINE ST.
CHESTNUT ST.
CHERRY ST.
SCHOOL ST.
DIVISION ST.
PEARL ST.
HOWELL CT.
HIGH ST.
BEACON PL
TREMONT ST.
PEMBROKE ST.
WINNISIMMET ST.
BROADWAY
FERRY ST.
MEDFORD ST.
Boston Rubber Co. File No. 206
Metropolitan Service Mains fed during fire by 36" & 24"
Chelsea Bridge
To Charlestown
Geo. D. Emery Co. File No. 3116 M.S.
MYSTIC RIVER
United States Hospital Grounds
Wind blowing in this direction. Velocity 26 to 36 miles per hour.
N
W
E
S

ADDISON ST.
ORANGE ST.
SPRUCE ST.
BLOSSOM ST.
HEARD ST.
EDEN ST.
WASHINGTON AVE.
TUDOR ST.
LAWRENCE ST.
CLARK AVE.
CARBY
BROADWAY
AVE
SPENCER ST.
New High School
Conn. between High & Low Service
Union Park
SIXTH ST.
FIFTH ST.
Notre Dame School & Convent
The Griffin Wheel Co
GERRISH AVE.
St. Rose Roman Catholic Church
St. Rose Parochial School
Boston Elevated R. R. Co. File No. 4000, Item 98.
U. S. Foundry Co
W. Y. Russo File No.
B. & A. R. R.
A. A. White & Co.
MATTHEWS ST.
Fitz Public Library
Christian Science Hall
MARLBORO ST.
Mt. Bellingham M. E. Church
GROVE ST.
Old High School
Central Fire Station
Synagogue
Williams Public School
Church of the Redeemer (First Universalist)
CHESTNUT ST.
CHERRY ST.
LUTHER PL
Y. M. C. A.
Hawthorne Hall
SHURTLEFF ST.
SHAWMUT ST.
HAWTHORNE ST.
BELLINGHAM ST.
MT. BELLINGHAM
COTTAGE ST.
CHESTER ST.
Highland School
Garden Cemetery
LYNN ST.
WATTS ST.
CENTRAL ST.
Conn. between High & Low Service
HIGHLAND ST.
MAVERICK ST.
Oil Storage
CONGRESS AVE.
ESSEX ST.
Hose Cart
Shurtleff School
ELLSWORTH ST.
PEARL ST.
MILLER ST.
MARGINAL ST
American Circular Loom Co. File No. 2224
SUFFOLK ST.
Roof damaged
CHARLES ST.
Conn.
Green's Lumber Yard
Tanks
Magee Furnace Co. File No. 2526
Austin Biscuit Co.
R. Holman (Wood Working)
Dredge & 2 Scows burned
Scow burned
Metropolitan Mains Reading East Boston only
CHELSEA CREEK
Tide Flowing ⟶ after 2.00 P. M.
Meridian St Bridge
To East Boston
Notation.
Fire Line.
Bldgs. burned.
Bldgs. not burned.
Street Mains.
Hydts.
Chelsea Trust Co
Masonic Hall
BROADWAY
DIVISION ST.
Engine No. 1
Engine No. 1
PARK ST.
FOURTH ST.
CHERRY ST.
Chelsea Water Works
First Baptist Church
St. Luke's Episcopal Church
City Hall & Public School
MERCANTILE
RESIDENTIAL

SHOWING


ADDISON ST.
ORANGE ST.
BLOSSOM ST.
HEARD ST.
EDEN ST.
WASHINGTON AVE.
TUDOR ST.
LAWRENCE ST.
CLARK AVE.
CAREY
BROADWAY AVE
SPENCER ST.
New High School
Railroad Station
CHESTER AVE.
Notre Dame School & Convent
The Griffin
GERRISH AVE.
St. Rose Roman Catholic Church
St. Rose Parochial School
Boston Elevated R. R. Co. File No. 4000, Item 98.
MATTHEWS ST.
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Christian Science Hall
MARLBORO ST.
GROVE ST.
Mt. Bellingham M. E. Church
Old High School
Central Fire Station
MT. BELLINGHAM
BELLINGHAM ST.
COTTAGE ST.
CHESTER ST.
Garden Cemetery
LYNN ST.
CENTRAL ST.
MAVERICK ST.
CONGRESS AVE.
ESSEX ST.
Hose Cart
Shurtleff School
St. Luke's Episcopal Church
City Hall & Public School
Y.M.C.A. Hawthorne Hall
To Reservoir
First Baptist Church
SHURTLEFF ST
SHAWMUT ST.
HAWTHORNE ST.
SIXTH ST.
FIFTH ST.
Union Park
Synagogue
Central Congregational Church
First M.E. Church
Williams Public School
Church of the Redeemer (First Universalist)
ARLINGTON ST.
VALE ST.
ASH ST.
WALNUT ST
POPLAR ST.
CHESTNUT ST
LUTHER PL
CHERRY ST.
BROADWAY
Chelsea Trust Co.
Masonic Hall
FOURTH ST.
DIVISION ST.
Engine Ho No. 1
PEARL ST.
Chelsea Water Works
PARK
Band Stand
BROADWAY Park
SQUARE
Salvation Army
SCHOOL ST.
ESSEX
ELLSWORTH ST.
MILLER ST.
WINNISIMMET ST.
WILLIAM ST.
MARGINAL ST
Roof damaged
CHARLES ST.
Conn.
Boston Rubber Co. File No. 206
Megee Furnace Co. File No. 2526
Austin Biscuit Co.
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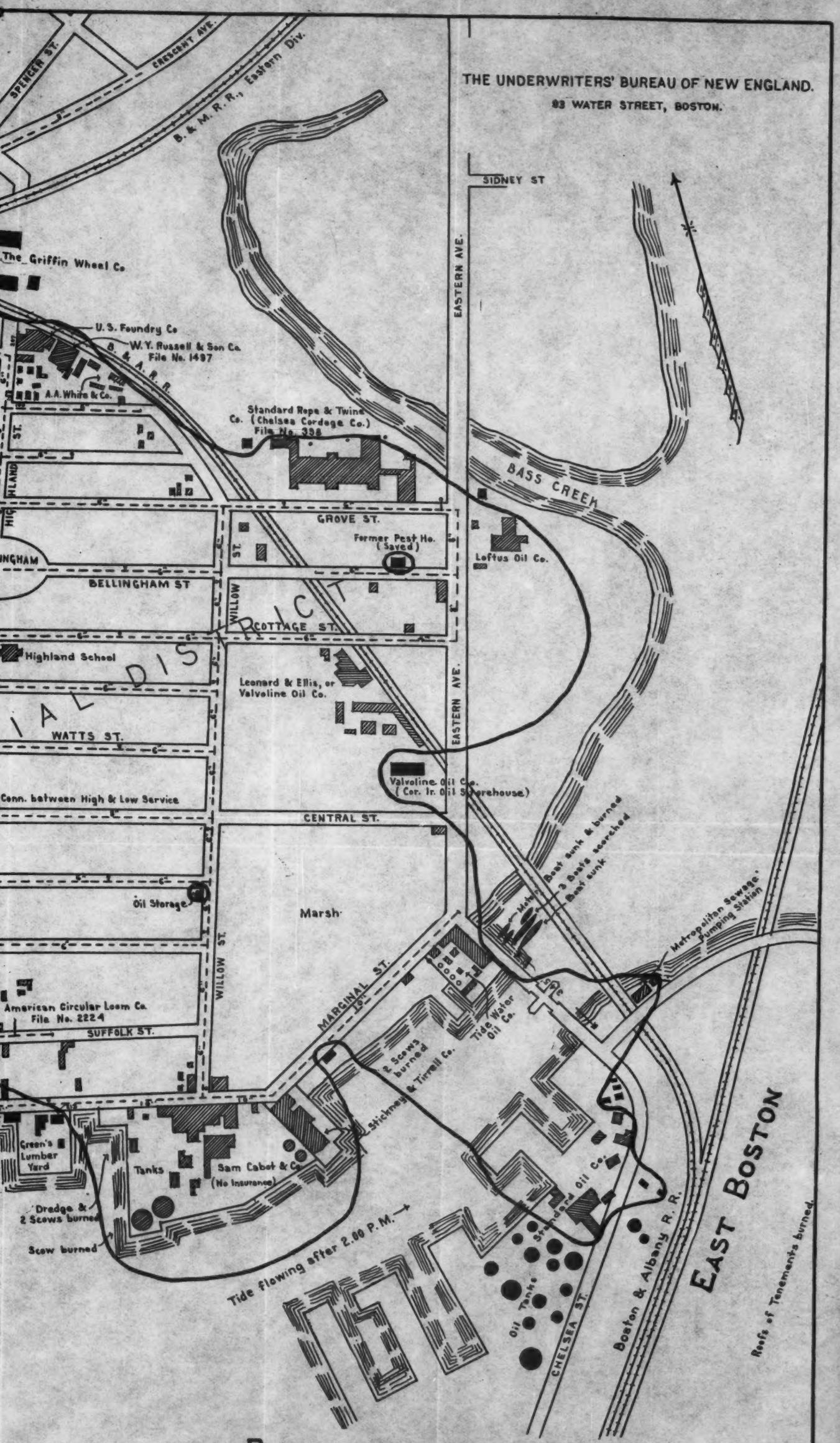
To East Boston
Notation.
Fire Line.
Bldgs. burned.
Bldgs. not burned.
Street Mains.
Hydts.

THE UNDERWRITERS' BUREAU OF NEW ENGLAND.
93 WATER STREET, BOSTON.



PLAN TO ACCOMPANY REPORT ON

CHELSEA CONFLAGRATION,

CHELSEA, MASS.

DATE OF FIRE, APR. 12, 1908.

SCALE 0' 100' 200' 300' 400' 500'

SHOWING ONLY PRINCIPAL BLDGS. & BLDGS. NEAR FIRE LINE.

I. W.

their position and the falseness of their economy. It is the insurance companies who pay the bills in case of a conflagration and it is the duty of officials to recognize and follow the rules and suggestions made by fire protection engineers who are impartially endeavoring to decrease the fire waste of the country. Automatic sprinklers are well known to be the cheapest method of extinguishing fires and in ninety-three per cent. of the cases they are successful. Any policy of water works officials which discourages sprinkler equipments should be strongly condemned.

The Underwriters' Bureau of New England,

GORHAM DANA, *Manager.*

The Atlanta Conflagration.

On Friday, May 8, 1908, Atlanta, Ga., was visited by the worst conflagration in its history, excepting of course its destruction by fire during the Civil War in 1864. The monetary loss will amount to about one and one-quarter million dollars, while the insurance loss will probably be in the neighborhood of nine hundred thousand dollars. Thirty different buildings were either destroyed or damaged. No lives were lost.

The purpose of this report will be to describe as accurately as circumstances will allow, the conditions which made possible this conflagration, to give briefly a story of the fire and to point out the lessons it teaches. Fire protection engineers will probably find but little in this report of especial interest, but it is hoped that a few of the more important conclusions drawn will be brought to the attention of municipal authorities, not only of the city of Atlanta, but elsewhere. Reference will be made to plan accompanying report as occasion requires.

Occupancy and Construction of Buildings Involved.

Occupancy—The occupancy of mercantile buildings can be noted from plan attached.

Nos. 70-76 Madison Avenue—Schlesinger-Meyer Baking Company and H. L. Schlesinger—Candy, cracker and bread factory. Four stories and basement, over all dimensions 105x200, area (deducting 1,500 square feet for Boiler House) 19,500 square feet, brick, semi-mill construction, gravel roof.

Nos. 44-68 West Mitchell Street—This group of buildings, located across 15′ alley to northeast of H. L. Schlesinger's Candy Factory, were three-story, brick structures, of ordinary joisted construction, with concealed spaces in floors; roofs gravel and composition. Buildings had unprotected cast iron columns and steel "I" beams, except Nos. 44 to 52, the floors of which were partly supported by wood posts; compartments separated by ordinary brick bearing division walls, parapeted 2 to 3′. No openings in division walls of this group.

Nos. 9-13 Nelson Street—Four-story, brick, plank and timber constructed buildings (self-releasing timbers), gravel or composition roofs; the two buildings separated from each other by blank 13, 17, 17″ brick bearing wall, parapeted 2′; No. 13 building was separated from Schlesinger-Meyer Baking Company and H. L. Schlesinger's Candy Factory by deficient (13, 13, 17, 17″) blank wall parapeted 2 to 3′.

Nos. 5-7 Nelson Street—Three-story brick building of similar construction as Nos. 9-13 and separated from latter by 13, 17, 17″ wall, parapeted 2′, and having openings protected by practically standard fire-doors.

Buildings Nos. 79-97 South Forsyth Street—All two-story except No. 79-81 building, which was three stories high; all of ordinary brick

construction, with concealed spaces and composition or gravel roofs. Division walls very deficient in thickness, as may be noted from plan.

Buildings Nos. 49-63 West Mitchell Street—Three-story, brick, ordinary joisted construction, with unprotected cast iron columns and steel "I" beams, and composition or gravel roofs. Nos. 49-51 buildings, slightly detached to west of another three-story brick building of ordinary construction, had fire shutters protecting openings on second and third floors and unapproved wired glass windows on first floor; the openings in exposing building facing were unprotected. The wall between Nos. 51 and 55 was 13, 17 and 17″ and blank except to rear of No. 51 building; this wall in part was only one-story high, allowing communication from one building to another. The walls between buildings Nos. 57 and 59 were independent 13, 17, 17″, parapeted 18″, but had unprotected openings. Wall between Nos. 63-65 was 13, 17, 17″, parapeted 2′, and having openings facing exposures to west, protected by non-standard wired glass windows in metal frames. (See cut.)

Nos. 65-67 West Mitchell Street—Small three-story, brick, composition or gravel roof building, with three-story, brick boarding house to rear, all of ordinary construction, and slightly detached one-story, brick, composition roof kitchen.

Nos. 69-71 West Mitchell Street—Five-story, brick, metal roof building, of ordinary joisted construction, with unprotected cast iron columns and steel "I" beams, and unprotected openings all sides.

Building 48-50 Madison Avenue—Three-story, brick, of ordinary joisted construction, with concealed spaces; roof gravel; unprotected openings facing exposure to south, save in one case, where practically standard fire-door protected opening communicating with 69 to 71 West Mitchell street, through passageway on second floor.

Extent of Damage.

The block bounded by Madison avenue, Nelson street, South Forsyth and West Mitchell streets was practically totally destroyed, except in buildings Nos. 79-81 and 83 South Forsyth street; first story of 79 to 81, fronting on South Forsyth street, suffered only small lost; however, to rear of building on first floor and other stories a severe loss was sustained; small salvage in stock on first floor of No. 83 South Forsyth street.

Buildings Nos. 49 to 71 West Mitchell street, in block bounded by West Mitchell and South Forsyth streets, Madison avenue and Hunter street, practically totally destroyed.

Buildings on south side of Nelson street, occupied by Montag Bros., and Gholstin-Cunningham Spring Bed Co., suffered damage of cracked window panes, also slight water damage, as did also several of the buildings on east side of South Forsyth street facing this block.

Building Nos. 45-47 West Mitchell street suffered damage of cracked window panes, also considerable smoke damage, together with slight defacing of frontage.

Cut showing one of a number non-standard frames for wired glass and only moderately exposed externally. See plan Nos. 63 and 65 West Mitchell Street.

There were about twelve of these window frames with wired glass installed in west wall of Building No. 59 to 63 West Mitchell Street and exposed by three-story brick boarding house across 10-foot alley, also by one-story brick kitchen to rear of same. The windows, however, were subjected to heat from both sides, and as fire entered both buildings at same time all the windows failed. The heat was severe enough to melt the glass so that same flowed down over the sill.

NOTE.—It should be understood that the purpose in publishing this picture is not to discourage the use of approved wired glass in standard metal frames, but on the contrary to encourage its use. These frames were not only NON-STANDARD but were not subjected to a fair test by having both sides on fire at the same time. Part of the windows were also left open. Had all openings in this building been protected by wired glass there might have been a different story to tell.

Building Nos. 48-50 Madison avenue practically total loss on third story; considerable damage on second floor, but small damage first floor.

Story of the Fire.

Direction and Velocity of Wind—According to United States Weather Bureau Reports, the maximum velocity of the wind from 3 a. m. to 12 m. was 26 miles per hour, while the minimum registered 14 miles. The prevailing direction was from the west up to about 5 a. m.,

when it veered around to the northwest, where it remained for the rest of the day. The maximum velocity was reached at 4.20 and 5.10 a. m. The following is a log of the wind by hours and miles:

Time.	Miles.	Time.	Miles.
3 to 4	19	8 to 9	15
4 to 5	24	9 to 10	19
5 to 6	23	10 to 11	21
6 to 7	14	11 to 12	21
7 to 8	14		

Average velocity 19 miles.

A glance at the plan, accompanying this report, will show that at no time was the wind anything but unfavorable. These conditions were undoubtedly one of the principal causes for the rapid spread of the fire.

On the morning in question, at about 3.30 o'clock, a fire was discovered in the upper floors of a four-story and basement building, located on northeast corner of Madison avenue and Nelson street, occupied by Schlesinger-Meyer Baking Company and H. L. Schlesinger, as a candy, cracker and bread factory and bakery. Through a delayed alarm, large area and combustibility of stock in building where fire originated, coupled with a high wind, apparent weakness of water supply (pressure and volume) and unprotected window openings in closely exposed buildings, the fire developed into a conflagration which raged for nearly three hours, and was only gotten under control after destroying practically a block and a half of buildings.

There is no positive evidence available as to the origin of the fire. The assured is under the impression that fire was caused by direct current motor operating elevator located on wood platform suspended from ceiling of third floor. Elevator had been used by employees during part of the night.

On the morning of the fire, about five of the Schlesinger-Meyer Baking Company employees were on duty, on third floor of bakery, until 3 o'clock. One of the employees slept on premises, but had to be awakened to escape with his life. A watchman had recently been engaged jointly by H. L. Schlesinger and Schlesinger-Meyer Baking Company to patrol entire premises, and was on duty on night of fire. He was last seen by one of the employees at 3 a. m., on third floor. Watchman claims to have been on his rounds at 3.35 a. m., when his

attention was directed to sound of breaking glass. Upon going outside the building he discovered that fire was in progress in third or fourth floor of bakery. It is not known whether he made attempts to give alarm.

In the meantime, however, according to statement made by the assured, the fire had been observed by a pedestrian, who communicated his discovery to a passing fireman, who immediately sent in an alarm from nearest fire alarm box about one block distant.

About this same time fire was also discovered by watchman employed in Gholstin-Cunningham Spring Bed Factory across street

Looking north from Montag Brothers showing ruins of Liquid Carbonic Company who occupied both buildings. Fire entered these buildings through unprotected openings to rear facing narrow alley. It is claimed that not one of several thousand steel drums charged to 1,000 pounds per square inch with carbonic acid gas burst although subjected to fierce heat. Tanks in rear were filled with coke.

from Schlesinger Building, who, instead of turning an alarm from street box one block distant, lost much valuable time attempting to get telephone "Central." When interviewed he stated that fully five minutes, if not more, were lost before he succeeded in getting "Central;" and when asked why he didn't immediately turn in street box alarm, his answer was "that he had strict orders not to leave the building." As far as can be ascertained the fire was discovered and attempts made to notify "Central" about 3.35 a. m. Official alarm was received at No. 1 Fire Station at 3.46. These statements regarding watchmen's testimony are given for what they may be worth.

The first alarm brought Hose Companies Nos. 1, 2, 4, 5 and 8; Truck Companies Nos. 1, 2 and 3; Engine Companies Nos. 4 and 5, and Chemical Engines Nos. 1 and 2. Chief W. B. Cummings, who arrived with first alarm, at once sent in special call through street box No. 51, which resulted in two more engine companies, water tower and supply wagon being brought to the scene. This was followed by a general alarm by special call, which brought the balance of the department, including new Company No. 11. Chief stated about seven minutes elapsed between first and general alarms.

A Summary of Apparatus will be found in the following:

Hose Wagons, 11—Including three combination chemicals.

Engines, 8—1 first size; 3 second size and 4 third size; combined rated capacity 5,800 gallons per minute.

Hook and Ladder Trucks, 4—Including one aerial truck.

Chemical Engines, 2—(Two 50-gallon and two 60-gallon tanks respectively.)

Water Tower, 1—Fifty-five foot Hale, with two extra deck turrets.

Supply Wagons, 2.

"Joyner" Turrets, 1.

A total fighting force of about 170 men responded and were on duty during the fire.

In an interview with Chief W. B. Cummings, he stated that upon his arrival at the fire the flames were then coming out of the top windows of the Schlesinger Building next to the alley, and upon entering the building he observed fire and sparks falling down elevator shaft.

Note—A glance at the plan here will show that the division walls separating the four exposed buildings on the north side of the alley were of little value inasmuch as all these buildings were exposed at one and the same time by the unprotected window openings.

Upon arrival of apparatus attempts were made to fight the fire by using streams in the alley north of burning building. The plug streams used, however, were, on account of long lines of hose, too feeble to reach with effect the upper windows of the burning building and buildings exposed. By the time engine streams were available the flames had forced an entrance through unprotected windows in four buildings across alley to the north. Under influence of half a gale of wind the fire gained rapid headway, and soon involved buildings comprising about one-half the block bounded by Madison avenue, Mitchell, South Forsyth and Nelson streets, and with a stiff breeze blowing the flames northeast across Mitchell street and east toward other half of block, not yet touched and only separated by a narrow alley. Attempts to use the water tower first on Madison avenue and afterward on Mitchell street were of little avail, owing to poor service from three plug lines attached. Better service was secured from the water tower, however, later. This was the first time the tower had been used since being added to the department.

East of the Schlesinger Building was the four-story building occupied by Hirschberg Paper Company, and separated therefrom by a blank brick wall, parapet from 2 to 3'. Eye witnesses stated that the flames from the Schlesinger Building curled over this parapet and

fired the roof of the adjoining building (tar and gravel). The walls of the Schlesinger Building fell (mostly outward) about fifty minutes (upper wall deficient in thickness) after arrival of the department.

By this time part of the scenes of operation had been shifted to the block of four-story buildings detached north of the Schlesinger Building and separated only by a 15′ alley. About this time a change in the wind from west to northwest blew the flames southeastward through the alley, thereby forcing the fire into buildings hitherto untouched through unprotected openings. Fully two-thirds of this block was now involved and the fire had assumed the proportions of a conflagration—and it was realized that difficulty might be had in confining the fire even to this block. The firemen by this time had been compelled to move much of their apparatus to new positions and a stand was being made along Mitchell and South Forsyth streets.

About the same time that fire had communicated to buildings facing on South Forsyth street the flames had secured such headway in the buildings facing on West Mitchell street that the firemen were soon forced out of these buildings, and later from the west end of the street by falling walls, which allowed an unobstructed passage of the fire into the Terminal Hotel Building and buildings adjoining to the west located on north side of West Mitchell street. An engine located at hydrant at Mitchell street and Madison avenue was rescued with much difficulty.

After destroying Terminal Hotel and four buildings to the east, the fire practically burned itself out by reason of large open lot to the north, although much credit must be given firemen for the very efficient stand made in preventing progress of flames beyond Terminal Hotel Annex on the north and Nos. 45 to 47 Mitchell street on the east.

Fire was under control shortly after 6 a. m.

Weakness of Water Pressure—That there was an apparent weakness of water pressure during the early stages of the fire is evident, if any credence may be given the statements of the firemen as well as other eye witnesses. That the pressure was all that was desired during the latter stages of the fire is evidenced by the Chief of the Fire Department instructing the pumping station to reduce the pressure. This latter increase in pressure at fire district was largely due to the fact of a higher pressure being maintained at pumping station, together with the diminished number of streams used, also shutting off of service connections in fallen buildings.

There were other conditions, however, which, unknown to anybody at the time, had a large bearing upon the effectiveness of the water pressure. The Schlesinger Building was provided with two 4″ street connections for supplying the vertical pipes and hose with which the building was equipped. These 4″ pipes were connected to the 12″ main in Madison avenue, and entered each section of the building (see plan). They were not only provided with outside street cut-offs, but had in addition inside controlling valves located in basement. Shortly after the arrival of the firemen the walls of this building fell, breaking off the 4″ pipes inside the building and covering up the valves in the

streets under tons of brick. These valves were not shut off until the arrival of an official from the Water Works Company. After removal of debris from street, one connection was shut off. This was about 7.30 a. m., or over three hours after walls fell. For some unaccountable reason the other connection was not shut off until two hours later.

From the above it will be seen that besides the 22 odd fire streams (17 being worked through eight fire engines) there was a further draft on the system of two 4" broken outlets emptying into the Schles-

"Allith" hardware and practically standard door. Door on other side of wall about in same condition. Black space on wall to right of door shows remains of brick vault supported by unprotected steel beams and cast iron columns. Other door to right was left open.

inger Building. This water in itself would have been sufficient to supply two first-class engines to their full capacity—which would have meant eight streams more. To make matters even worse, when the walls of the Terminal Hotel fell at about 6 a. m., a full size hydrant on the corner, which was in service, was broken off flush with the sidewalk. Considerable time was lost before this was shut off. Hydrant was fortunately provided with an independent gate valve, thereby not necessitating shutting off anything but the hydrant.

By reference to the plan accompanying it will be noted that the largest main in this vicinity was 12", gridironed with and supplied by 6 and 8", surely not a distribution from which the equivalent of 34 fire streams (not counting broken hydrant) could be taken without expecting a material lowering of the available pressure.

Note—It will be noted from plan that there was a 20″ main on Broad street, only about 300 feet distant from heart of fire, yet only two fire engines used hydrants connected to this main. When this change was made, it resulted in better streams all around on account of reduced draft on smaller mains. One of the engines took its water from cistern in Hunter street near Whitehall, supplied by hose connection to hydrant. It is claimed excellent streams were the result.

During the 24 hours of May 8, 1908, 2,500,000 gallons of water were pumped in excess of daily domestic consumption (10,500,000 gallons), probably two-thirds of which was used during first three and one-half hours of the fire.

The following data was taken from the dial (ink) attached to recording gauge in Water Works City Office on day of fire:

	Time A. M.		Pounds Pressure per square inch.	
	3.45		50—60	
(Time of alarm)	3.48	Sudden Increase to	80	
			80	
Decrease caused by large number of engines drafting from mains, also broken connections of falling walls	4.00	Gradual Decrease to	65	(minimum 50)
	4.30	Gradual Increase to	75	
	4.50	Gradual Decrease to	68	
Request by phone from fire department headquarters for more pressure	6.45	Sudden Increase to	82	
Increase caused by shutting of broken connections and using less number of fire streams	6.50	Gradual Increase to	95	
Chief phoned for reduced pressure	11.45		65—75	
	11.50			

Conditions at Pumping Station During Fire—On the day of the fire a visit by one of our inspectors was made to the Hemphill Avenue Pumping Station of the Atlanta Water Works, for the purpose of examining the dials of recording water pressure gauge to denote pressure maintained at that point during time fire was in progress. Our inspector arrived at the station at about 3.30 p. m. and found the Chief Engineer in charge. As a result of this visit it was found that the recording water pressure gauge was out of order—same not registering more than 130 pounds. It was claimed that a pressure of 130 to 150 pounds had been maintained on the pumps from 3.48 a. m. (time of receipt of alarm) until 11.50 a. m., when, by instructions from the Chief of Fire Department, pressure was reduced to 135.

The statements of the Chief Engineer at the pumping station were verified from the record taken from the recording gauge indicated at noon, and in further confirmation of this gentleman's remarks the pumps were speeded up until they were maintaining a pressure of 150 pounds (per direct reading gauge), the recording gauge showing no change from its previous reading (130 pounds). The conclusion that may be drawn from the above, is, that 130 to 135 pounds pressure was maintained at the pumping station until 6.45 a. m., or until request for more pressure from Fire Department Headquarters, and 150 pounds from then on until 11.50 a. m., or when ordered to be reduced by the Chief of the Fire Department.

Note—It might be well to call attention at this point to the fact that ordinarily the difference between pressures (domestic and fire) maintained at pumping station and the district where fire prevailed is 60 to 70 pounds, but on the day of the fire a difference of 70 to 90 pounds was maintained. This may be readily seen from the following table:

		Pumping Station.	Water Works City Office. City elevation 1,042 feet.	Fire Department Headquarters. City elevation 1,062 feet.	District of Fire (May 8, 1908.) City elevation 1,072 feet.
Average Normal Domestic Pressure.	During Day..	120	60	50	45
	During Night	110	55	45	40
Average Fire Pressure	.....	130	70—80	60	55
Fire Pressure (May 8, 1908)....		130-135-150	80	60	..

Note—The Water Works City Office is located four blocks from the fire district and street grade is 30′ lower than same. Fire Department Headquarters is 10′ lower than fire district and 20′ higher than Water Works Office.

Conclusions and Recommendations.

I submit the following as the more important facts which have been clearly demonstrated as a result of this fire:

1. The necessity of adequate and reliable watchman's or other approved alarm service in all important buildings within the fire limits, especially when of special hazard occupancy.

Were it not for a long delayed alarm there is no reason to believe but that this fire would have been confined at least to the building in which it originated, especially in view of the fact of same being of slow burning or semi-mill type of construction.

An approved thermostatic alarm system is recommended in preference to a watchman.

2. That restrictions limiting the area of buildings within fire walls should be adopted and enforced.

The large unbroken floor area of the Schlesinger Building (19,500 square feet) filled with combustible material, coupled with the delayed alarm and stiff wind, allowed the flames to gain great headway. Under such conditions are developed the severest fires, thereby constituting the foundation of a general conflagration.

Restricting the area of such buildings would seem to be the

Standard hardware (Allith) and sub-standard door. These doors were on each end of a closed passageway leading from second floor of Terminal Hotel to Annex to north.

safest practice, except where adequate inside fire protection has been provided such as automatic sprinklers.

3. The imperative need of proper protection of all exposed exterior openings across narrow streets and alleys, light courts, etc., standard fire shutters, steel rolling shutters, wired or prism glass, in standard metal frames, or open sprinklers, or any of the above devices in combination can be effectively used for protection of exterior openings in buildings. Their selection, however, should depend upon the nature and severity of the exposure inasmuch as their fire retardant qualities are not equal.

A 15′ alley separated the Schlesinger Building from the four buildings to the north; numerous unprotected windows (60 to 80) on each

building facing. At the time of the arrival of the firemen the flames had already broken through the top story windows and were leaping clear across the alley, under the influence of the stiff west wind.

Without doubt had these exposed openings been protected even with wired glass or steel rolling shutters, the fire would, in all probability, never have spread beyond the Schlesinger Building, as the firemen could have concentrated their efforts on this one building instead of having practically half a dozen buildings on fire at one time to cope with.

4. More familiarity on the part of Fire Department Officials with local conditions in their respective districts.

A full knowledge should be had by two senior officers of each fire company of all large water service connections in all buildings in their respective districts, such as supply standpipes and hose, automatic sprinklers, etc. Especially should they know location of street valves controlling these connections.

Had some one forethought to have closed the street valves controlling standpipes in Schlesinger Building before they were covered by falling walls, there would not have been such a falling in water pressure as complained of.

A map showing size and location of all mains in each fire district should be posted in each engine house, also a card showing largest mains available near each fire alarm box given to each fireman.

Provision should be made, either by the Fire Department or Water Works Company, or both, for the detailing of reliable men to all fires for the purpose of closing any valves that may be necessary.

5. Larger mains and additional hydrants in the congested value district.

Where steamers are depended upon as in large fires, volume of water rather than pressure is necessary, and which can be had only when mains are of adequate size.

Forcing large pumping engines, thereby subjecting them, together with mains, to extreme pressures is extremely hazardous. At the recent fire a break in either pumping engine or the 30″ mains leading therefrom would have jeopardized the entire city.

Full size steamer hydrants should be distributed every 200 to 250′ apart throughout the business district.

Note—By reference to plan it will be noted that the 12″ main in Madison avenue extends three blocks, and is supplied by smaller mains, being gridironed with 6 and 8″.

6. That heaters should be provided in every engine house, by means of which the water in engine boilers may always be kept hot.

In going out of engine house with cold boilers, from 10 to 45 minutes, according to style of boiler on fire engines, is lost before effective steam pressure is generated.

Had good engine streams been available at the beginning of this fire the flames might have been prevented from entering building to

north of Schlesinger's. As it was the plug streams used could not reach the upper windows.

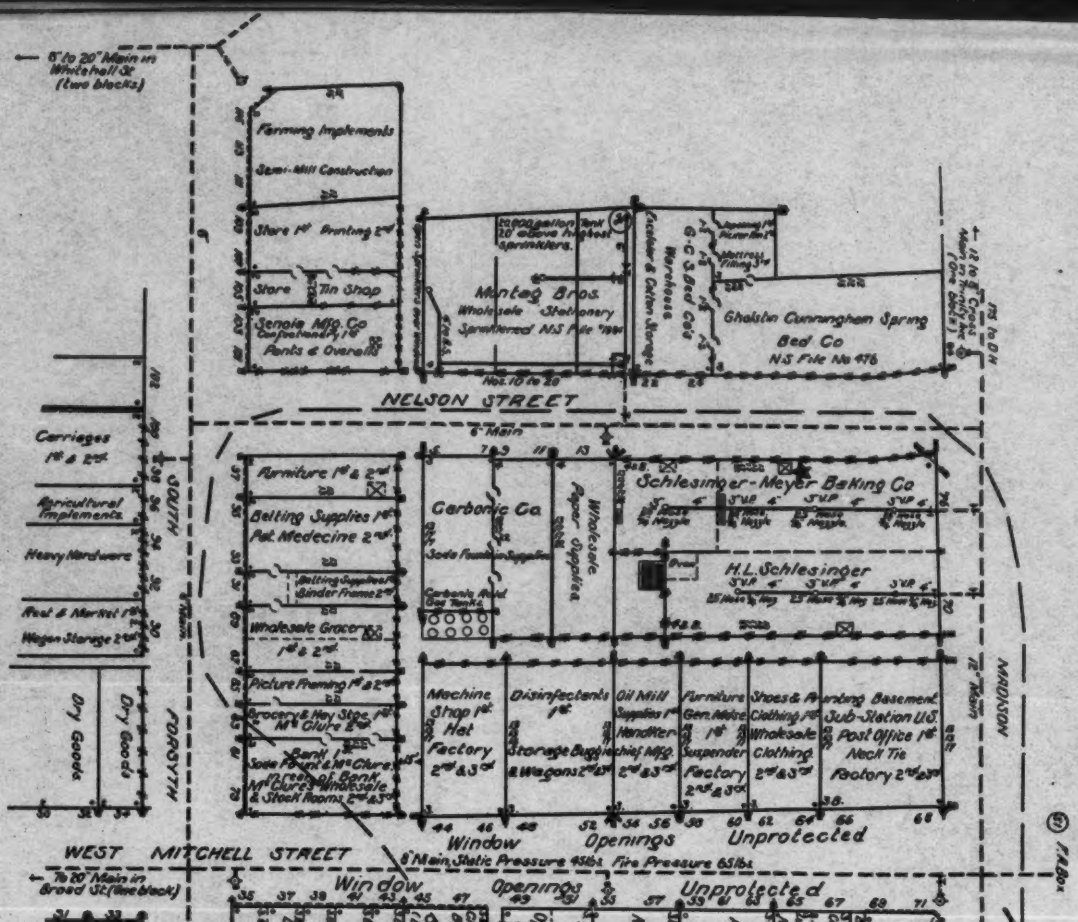
7. All of the large hazardous mercantile buildings should be protected by sprinkler equipments, and scrupulous care be observed in protecting them from exposure by the installation of approved window protective devices, consisting of standard fire shutters, steel rolling shutters, wired glass in standard frames, outside sprinklers or other devices.

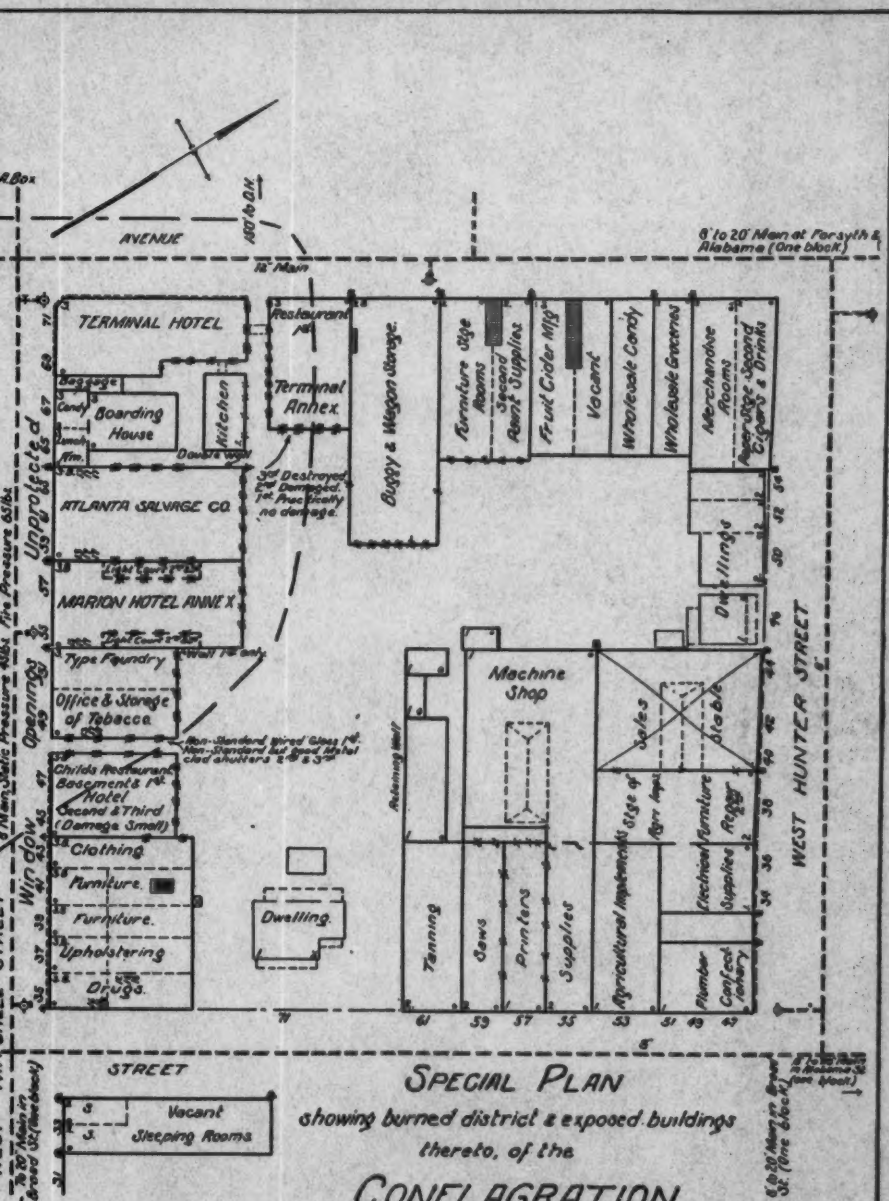
An automatic sprinkler system in Schlesinger's Building would have either extinguished the fire or held same in check until the arrival of the fire department.

8. The present building laws of the City of Atlanta should be revised or entirely superseded in order to provide better legal requirements for fire protection, especially in enforcement of fire-proof construction in large buildings, limitations of floor area and heights, and complete protection of windows, floor and roof openings. It is suggested that the building code recommended by the National Board of Fire Underwriters be used as a guide in framing any new code.

The results of faulty construction were much in evidence after this fire—showing walls deficient in thickness, poorly laid up interior courses of brick (practically no mortar), low parapets, unprotected steel beams and columns, hollow spaces between floors, unprotected floor, roof and window openings.

F. E. MacKNIGHT, *Chief Inspector and Engineer,*
The South-Eastern Tariff Association.


6" to 20" Main in Whitehall St (two blocks)
Farming Implements
Saw-Mill Construction
Store 1st Printing 2nd
Store
Tin Shop
Senoia Mfg Co
Overalls & Pants
Montag Bros
Wholesale Stationery
Sprinklered N.S. File 1991
Ghalstin Cunningham Spring Bed Co
N.S. File No 476
NELSON STREET
6" Main
Carriages 1st & 2nd
Agricultural Implements
Heavy Hardware
Wagon Storage 2nd
SOUTH FORSYTH
Dry Goods
Furniture 1st & 2nd
Belting Supplies 1st
Pat. Medecine 2nd
Whole sale Grocery 1st & 2nd
Picture Framing 1st & 2nd
Grocery & Hay Store 1st
Bank 1st
Soda Fount & Mc Clure's Bank
Mc Clure's Wholesale & Stock Rooms 2nd & 3rd
Garbonic Co
Soda Fountain Supplies
Wholesale Paper Supplies
Schlesinger-Meyer Banking Co
H.L. Schlesinger
MADISON
Machine Shop 1st Hat Factory 2nd & 3rd
Disinfectents 1st
Storage Buggies & Wagons 2nd & 3rd
Oil Mill Supplies 1st Handkerchief Mfg 2nd & 3rd
Furniture Gen. Mdse 1st Suspender Factory 2nd & 3rd
Shoes & Clothing 1st Wholesale Clothing 2nd & 3rd
Boarding Basement Sub-Station U.S. Post Office 1st Neck Tie Factory 2nd & 3rd
Unprotected
Window Openings
WEST MITCHELL STREET
8" Main Static Pressure 45 lbs Fire Pressure 65 lbs
To 20" Main in Broad St (Next block)
Window Openings Unprotected
★ - Origin of Fire.
Heavy dotted line includes buildings destroyed
~NOTE.~



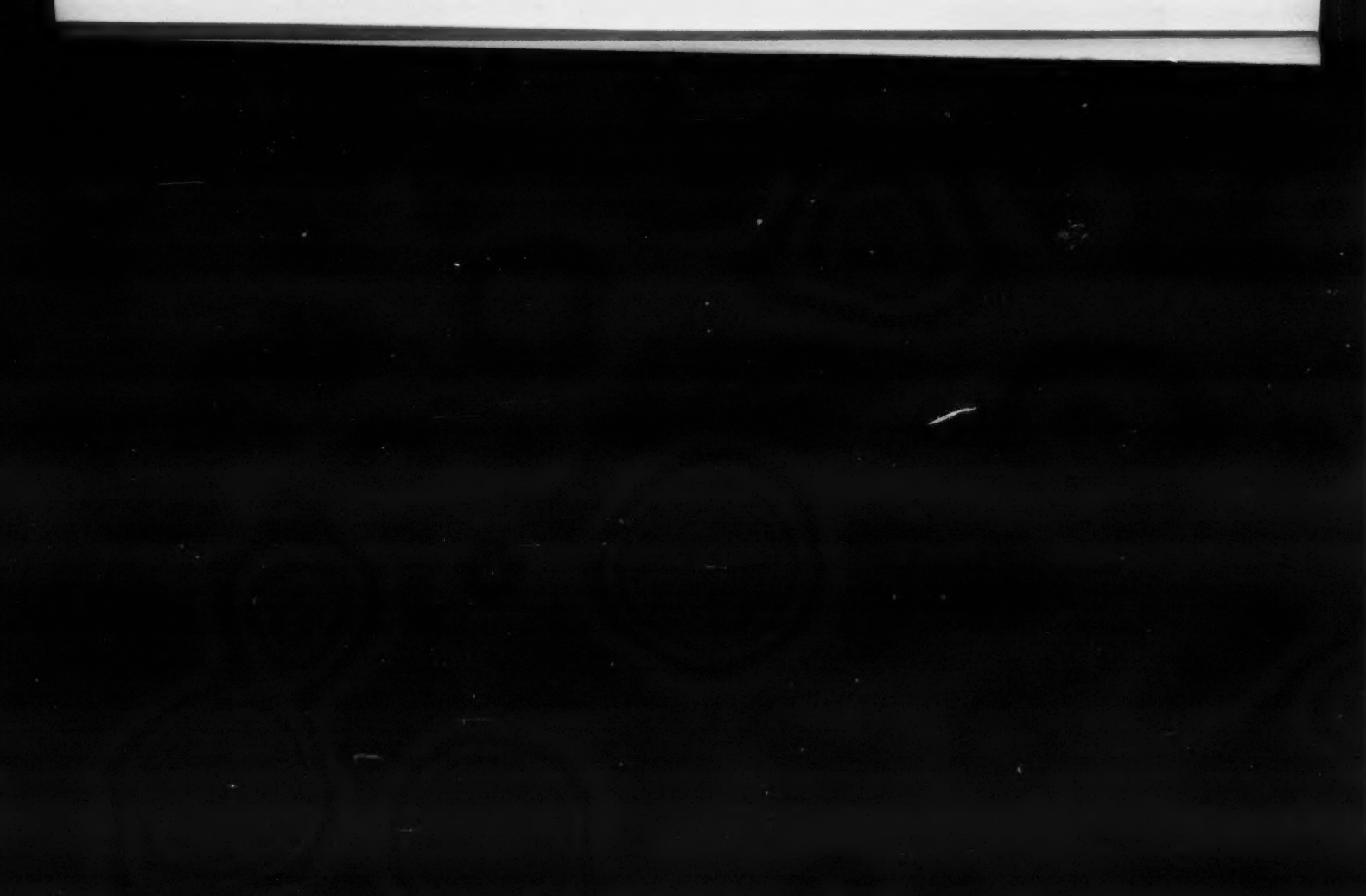
SPECIAL PLAN

showing burned district & exposed buildings thereto, of the

CONFLAGRATION IN ATLANTA, GA. MAY 8, 1908.

F. E. MacKnight,
Chief Inspector and Engineer.

s destroyed.



Secretary's Report, Branch Offices, and Underwriters' Laboratories.

APPROVED DEVICES AND MATERIALS.

By direction of the Executive Committee (action November, 1907) we list below in form convenient for reference by members the names and addresses of manufacturers of devices and materials which have thus far been favorably passed upon by the Committee of Devices and Materials, following examinations, tests and recommendations made by Underwriters Laboratories, Inc.

The Laboratories have also issued reports giving ratings unfavorable to a large number of appliances. A summary of the findings in each case can be obtained by addressing the Laboratories and any Active or Associate member can receive regularly the cards issued by the Laboratories giving summaries of the results obtained in the current work in all of its departments upon payment of the subscription price of fifteen dollars ($15) per year.

In the lists which follow members should note particularly that in those industries to which the label service has been extended (indicating inspection of goods by Laboratories' engineers at factories before shipment) that **only such of the product of these factories as bear the labels referred to** are covered by the endorsement of our Committee.

BUILDING MATERIAL.

Post Cap and Girder Support (Steel and Malleable Iron).

Caps inspected at factory bear labels attached to an exposed side reading as follows:

The following company is equipped to supply these devices. Members are advised to give preference to devices which bear the label referred to.

Chicago, A. M. Castle & Co., 55 N. Jefferson Street.

CARBONIC ACID GAS HAND FIRE EXTINGUISHERS.

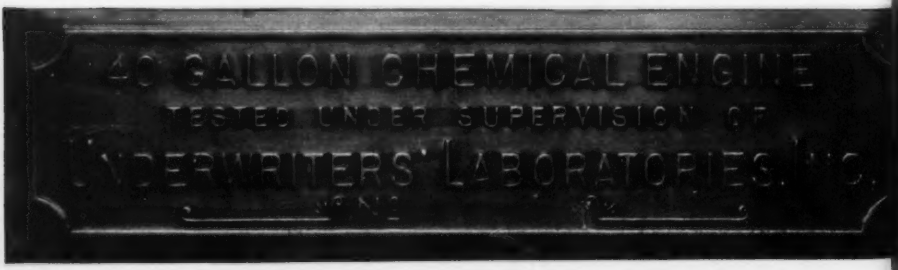
Carbonic Acid Gas Hand Fire Extinguishers constructed in accordance with National Fire Protection Association specifications and examined and tested at factories under the supervision of Underwriters' Laboratories, Inc., have metal labels soldered to the front of the cylinders reading:

The following companies are equipped to supply these devices. Members are advised to give preference to extinguishers which bear the labels referred to.

Boston, Badger Fire Extinguisher Co., 32 Portland Street.
Boston, Knight & Thomas, 99 State Street.
Buffalo, Western Inspection Co., 45 N. Division Street.
Chicago, Miller Chemical Engine Co., 149 E. Huron Street.
Cincinnati, Harker Mfg. Co., 118 W. Second Street.
Columbus, Seagrave Company, South High Street.
Elmira, N. Y., American-LaFrance Fire Engine Co., Elmira.
Newark, N. J., The Tea Tray Company of Newark, N. J., Mulberry and Murray Streets.
Philadelphia, James Boyd & Bro., 14 North Fourth Street.
Philadelphia, National Inspection Co., 418-422 Sansom Street.
Pittsburg, Fire Extinguisher & Supply Co., 1414-1422 Spring Garden Avenue, N. S.
Pittsburg, Pittsburg Lamp, Brass & Glass Co., Pittsburg.
St. Louis, Frank & St. Gemme Mfg. Co., 815-817 Market Street.
St. Louis, Missouri Lamp and Mfg. Co., 116 Elm Street.
St. Louis, Stempel Fire Extinguisher Co., 4250 North 20th Street.
Toronto, Canada. Victor Fire Extinguisher Company, 704 Continental Life Building.
Utica, O. J. Childs Co., 50 Liberty Street.

CARBONIC ACID GAS FIRE EXTINGUISHERS, 40 Gallon.

Carbonic Acid Gas Fire Extinguishers of 40 gallon capacity mounted on wheels, constructed in accordance with the latest specifications and examined and tested at factories under the supervision of Underwriters' Laboratories, Inc., have labels soldered to the front of the cylinder reading as follows:



The following company is equipped to supply these devices:

Boston, Badger Fire Extinguisher Co., 32 Portland Street.

DOORS.

N. F. P. A. Standard 2½ inch metal clad.

Doors of this class constructed in accordance with National Fire Protection Association specifications and examined and tested at factories under the supervision of Underwriters' Laboratories, Inc., are labeled by stampings in the tin plates or by attaching brass labels reading:

The following companies are equipped to supply these devices. Members are advised to give preference to doors which bear labels referred to.

Buffalo, Machwirth Bros. Co., 201-209 Oak Street.
Cleveland, O'Donnell Safety System Co., 3062 Superior Avenue, N. E.
Cleveland, Riester & Thesmacher Co., 325-329 Pearl Street.
Milwaukee, Consolidated Sheet Metal Works, 661-673 Hubbard Street.
Newburyport, Victor Manufacturing Co.
New Orleans, American Sheet Metal Works, Carrollton Avenue and Edinburg Street.
New Orleans, Estate of R. G. Holtzer.
New Orleans, A. J. Nelson Manufacturing Co., Ltd.
New Orleans, New Orleans Roofing and Metal Works.
New York, Howell & Lawrence, 1788 First Avenue.
New York, Manhattan Fire-Proof Door Co., 412-422 E. 125th Street.
New York, John W. Rapp, 1 Madison Avenue.
St. Louis, Mesker & Bro., 421-519 S. Sixth Street.

Door and Shutter, Metal.

Doors of this class which are considered to be the equivalent of the N. F. P. A. Standard 2½ inch metal clad door for openings not exceeding 72 inches in width and examined and tested at factories under the supervision of Underwriters' Laboratories, Inc., have labels riveted to the door reading as follows:

(*See label under N. F. P. A. Standard 2½ inch metal clad door.*)

The following company is equipped to supply these devices. Members are advised to give preference to doors which bear label referred to.

Memphis, Tenn., Saino Fire Door and Shutter Co., 538 Lucy Avenue.

Corridor or Partition Doors. (Not for openings in fire walls.)

Doors of this class constructed in accordance with National Fire Protection Association specifications and examined and tested at factories under the

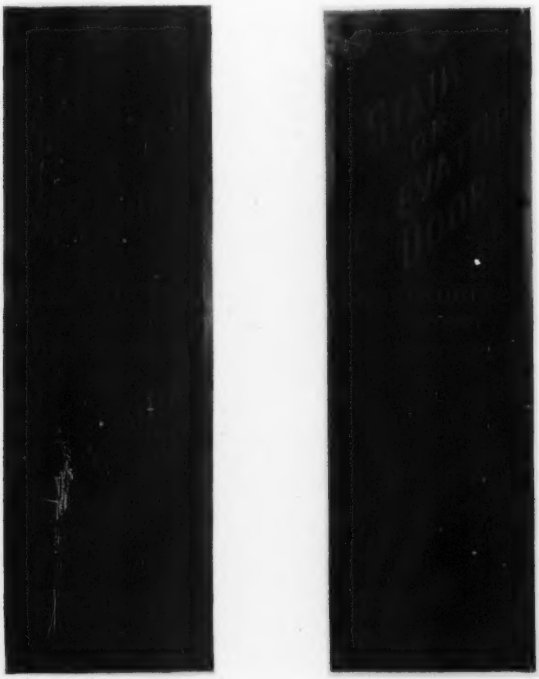
supervision of Underwriters' Laboratories, Inc., have labels screwed or riveted to the edge of the door reading: (See cut.)

The following companies are equipped to supply these devices. Members are advised to give preference to doors which bear the labels referred to.

Chicago, Knisely Bros., Fifth Avenue and 28th Place.
Chicago, Voigtmann & Co., 42-54 East Erie Street.
Jamestown, N. Y., Dahlstrom Metallic Door Co., Jamestown.
Minneapolis, Minn., Northwestern Roofing, Cornice and Stamping Works, 113 S. Fifth Street.
Minneapolis, Minn. Thorp Fireproof Door Co., 1600-1616 Central Avenue.
New York, J. F. Blanchard Co., Fuller Bldg.
New York, Howell & Lawrence, 1788 First Avenue.
New York, Manhattan Fire Proof Door Co., 412-422 E. 125th Street.

Stair or Elevator Doors. (Not for openings in fire walls.)

Doors of this class constructed in accordance with National Fire Protection Association specifications and examined and tested at factories under the supervision of Underwriters' Laboratories, Inc., have labels screwed or riveted to the edge of the door reading: (See cut.)



The following companies are equipped to supply these devices. Members are advised to give preference to doors which bear labels referred to.

Jamestown, N. Y., Dahlstrom Metallic Door Co., Jamestown.
Minneapolis, Minn., Northwestern Roofing, Cornice and Stamping Works, 1113 S. Fifth Street.
Minneapolis, Minn., Thorp Fireproof Door Co., 1600-1616 Central Avenue.
New York, J. F. Blanchard Co., Fuller Bldg.
New York, Howell & Lawrence, 1788 First Avenue.
New York, Manhattan Fire Proof Door Co., 412-422 E. 125th Street.

DOOR AND SHUTTER HARDWARE.

3½ x ⅜ Hardware for Sliding Doors only.

Hardware of this class constructed in accordance with National Fire Protection Association specifications and examined and tested at factories under the supervision of Underwriters' Laboratories, Inc., have labels attached to each hanger, binder and stay roll of each set reading:

A tag is also attached to one hanger of each set on which is printed a list of the pieces which a complete set should contain, as follows:

1. **One 3½x⅜ inch track, length to be equal to twice the width of door opening plus 21 inches. Punched for wall bolts.**
2. **Two hangers for openings 6 feet and less in width, three hangers for openings wider than 6 feet. Bolts for attaching hangers to door.**
3. **Two 3½x⅜ inch binders.**
4. **One 2x½ inch stay roll.**

Stay roll should be the type specified for the form of sill used, and should include all bolts except wall bolts.

5. **One cast iron bracket for each track bolt.**
6. **Two ¾x¼ inch half oval chafing strips for back of door, two 1x⅛ inch flat strips for front of door opposite the oval strips. Bolts for fastening above strips together through door. Length of above strips to be 4 inches less than door opening.**
7. **One 1½x⅛ inch strip 5 inches less than width of door to take wear of stay roll. Wood screws for attaching.**
8. **One wedge with screws for attaching.**
9. **One bow shaped handle and one flush pull with bolts and screws for attaching.**
10. **One front bumper and one back bumper.**
11. **Four bumper shoes and screws for attaching.**
12. **One washer for each wall bolt, including those for binders and stay roll.**
13. **One instruction card for mounting.**

Where the hardware for a single fire door on each side of the fire wall is bolted together through the wall, the washers above specified are unnecessary.

Wall bolts are not included as the requirements for length varies in each case. Automatic attachments are not as yet included in a standard set of hardware.

The following companies are equipped to supply these devices. Members are advised to give preference to hardware which bears the labels referred to.

Aurora, Ill., Richard Mfg. Co., Aurora.
Aurora, Ill., Wilcox Mfg. Co., Aurora.
Milwaukee, Wis., Stowell Mfg. & Foundry Co.
Newburyport, Mass., Victor Manufacturing Co.
Philadelphia, James Peters & Sons, 1934-38 North Front Street.
Richmond, Ind., Richmond Safety Gate Co.

Specially Designed, Malleable Iron Hardware for Sliding Door Only.

Hardware of this type which is considered to be the full equivalent of the 3½ x ⅜ hardware made in accordance with National Fire Protection Association specifications, and examined and tested at factories under the supervision of Underwriters' Laboratories, Inc., have labels attached to each hanger, binder and stay roll of each set reading:

(*See label under hardware for sliding doors.*)

A tag is also attached to one hanger of each set on which is printed a list of the pieces which a complete set should contain, as follows:

1. **One 1 7-16 inch tubular track, length to be equal to twice the width of the door opening, plus 14 inches.**
2. **Two hangers for openings six feet and less in width; three hangers for openings wider than six feet. Bolts for attaching hangers to door.**
3. **Two malleable iron binders.**
4. **One malleable iron stay roll.**
5. **Brackets to carry track, including two special end supports.**
6. **Two ¾x¼ inch half oval chafing strips for back of door, two flat strips for front of door opposite the oval strips. Bolts for fastening above strips together through the door. Length of above strips to be 4 inches less than door opening.**
7. **One 2¼x⅛ inch strip 5 inches less than width of door to take wear of stay roll. Wood screws for attaching.**
8. **One steel wedge with screws for attaching.**
9. **One bow shaped handle and one flush pull with bolts for attaching.**
10. **One front bumper and one back bumper.**
11. **Four bumper shoes and screws for attaching.**
12. **One washer for each wall bolt, including those for binders, bumpers and stay roll.**

Where the hardware for a single fire door on each side of the fire wall is bolted together through the wall, the washers above specified are unnecessary.

Wall bolts are not included as the requirements for length vary in each case. Automatic attachments are not as yet included in a standard set of hardware.

UNDERWRITERS' LABORATORIES, Inc.,
382 Ohio St., Chicago.

The following companies are equipped to supply these devices. Members are advised to give preference to hardware which bears the labels referred to.
Chicago, Allith Manufacturing Co., Taylor Street and 43rd Avenue.

Hamilton, Ont., Allith Manufacturing Co.

Specially Designed Malleable Iron Hanger and Brackets, and Tubular Steel Track With 3½x⅜ Inch Hardware.

Hardware of this type consisting of specially designed malleable iron hanger and brackets, and tubular steel track in combination with a complete set of approved 3½x⅜ inch fixtures for sliding doors, which is considered to be the

full equivalent of the 3½x⅜ hardware made in accordance with the National Fire Protection Association specifications, and examined and tested at factories under the supervision of Underwriters' Laboratories, Inc., have labels attached to each hanger, binder and stay roll of each set reading:

(*See label under hardware for sliding doors.*)

A tag is also attached to one hanger of each set on which is printed a list of the pieces which a complete set should contain, as follows:

1. One 1⅜ inch tubular steel track, length to be equal to twice the width of the door opening, plus 14 inches.
2. Two hangers for openings 6 feet and less in width; three hangers for openings wider than 6 feet. Bolts for attaching hangers to door.
3. Two 3½x⅜ inch binders.
4. One 2x½ inch stay roll.
Stay roll should be the type specified for the form of sill used, and should be provided with all bolts except wall bolts.
5. Malleable iron brackets for carrying tracks, including two special end supports.
6. Two ¾x¼ inch half oval chafing strips for back of door; two flat strips for front of door opposite chafing strips. Bolts for fastening strips together through door. Length of above strips to be 4 inches less than door opening.
7. One 1½x⅛ inch strip 5 inches less than width of door. Wood screws for attaching.
8. One wedge with screws for attaching.
9. One bow shaped handle, and one flush pull with bolts for attaching.
10. One front bumper and one back bumper, identical with and in addition to binders.
11. Four bumper shoes and screws for attaching.
12. One washer for each wall bolt, including those for binders, bumpers and stay roll.
13. One instruction card for mounting.
Where the hardware for a single fire door on each side of the fire wall is bolted together through the wall, the washers above specified are unnecessary.
Wall bolts are not included, as the requirements for length vary in each case. Automatic attachments are not as yet included in a standard set of hardware.

The following company is equipped to supply these devices. Members are advised to give preference to hardware which bears the labels referred to.

Aurora, Ill., Wilcox Manufacturing Co.

Specially Designed Malleable Iron Hangers, With 3½x⅜ Inch Hardware.

Hardware of this type consisting of specially designed malleable iron hangers in combination with a complete set of approved 3½x⅜ inch fixtures for sliding doors and examined and tested at factories under the supervision of Underwriters' Laboratories, Inc., have labels attached to each hanger, binder and stay roll of each set reading:

(*See label under hardware for sliding doors.*)

A tag is also attached to one hanger of each set on which is printed a list of the pieces which a complete set should contain, as follows:

1. One 3½x⅜ inch track, length to be equal to twice the width of door opening, plus 21 inches. Punched for wall bolts.
2. Two adjustable malleable iron hangers for openings 6 feet and less in width; three hangers for openings wider than 6 feet. Bolts for attaching hangers to door.
3. Two 3½x⅜ inch binders.
4. One 2x½ inch stay roll.
5. One cast iron bracket for each track bolt.
6. Two ¾x¼ inch half oval chafing strips for back of door, two flat strips for front of door opposite the oval strips. Bolts for fastening the above strips together through door. Length of above strips to be 4 inches less than door opening.
7. One 1½x⅛ inch strip 5 inches less than width of door to take wear of stay roll. Wood screws for attaching.
8. One cast iron wedge with screws for attaching.
9. One bow shaped handle and one flush pull with bolts for attaching.
10. One front bumper and one back bumper.
11. Four bumper shoes and screws for attaching.
12. One washer for each wall bolt, including those for binders and stay roll.

Where the hardware for a single fire door on each side of the fire wall is bolted together through the wall, the washers above specified are unnecessary.

Wall bolts are not included as the requirements for length vary in each case. Automatic attachments are not as yet included in a standard set of hardware.

Approval of this device is limited to locations where an adjustable hanger is acceptable to Underwriters having jurisdiction.

The following company is equipped to supply these devices. Members are advised to give preference to hardware which bears the labels referred to.

South Wilwaukee, Wis., Stowell Mfg. and Foundry Co.

FIRE DOORS. (See Doors.)

GLASS. (See Wired Glass.)

HARDWARE. (See Door and Shutter Hardware also Window Hardware.)

HEAT INSULATING COVERINGS.

The following material is approved for heat insulating purposes for walls, floors and ceilings in cold storage warehouses, cold storage cellars in breweries, cold rooms in packing houses, hotel refrigerators, fur storage rooms and rooms of this character.

Cork Board (Nonpareil) laid in cement mortar. Manufactured by Armstrong Cork Co., Pittsburg, Pa.

HOSE.

2½ Inch Cotton Rubber-Lined.

Private Department Fire Hose for outside use constructed in accordance with National Fire Protection Association specifications and examined and tested at factories under the supervision of Underwriters' Laboratories, Inc., have attached to each 50 foot length label reading:

The following companies are equipped to supply this material. Members are advised to give preference to hose which bears label referred to.

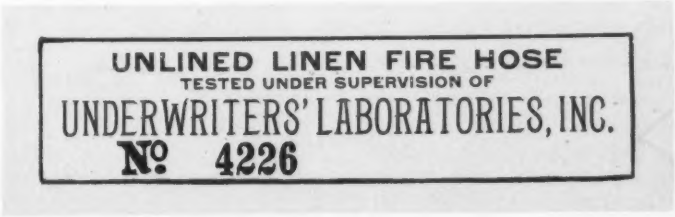
Akron, O., B. F. Goodrich Co., Akron.
Cambridge, Mass., Boston Woven Hose and Rubber Co.
New York, Eureka Fire Hose Mfg. Co., 13 Barclay Street.
New York, Manhattan Rubber Mfg. Co., 18 Vesey Street.
New York, New York Belting and Packing Co., Ltd., 91 Chambers Street.
New York, Fabric Fire Hose Co., Corner Duane and Church Streets, Elkshead.

Before the extension of the label service to this industry approvals were granted to certain brands of hose manufactured by the foregoing and other companies as follows:

American, Boston Belting Co., 256 Devonshire Street, Boston, Mass.
G. P., Gutta Percha and Rubber Mfg. Co., 126 Duane Street, New York.
Guttaperch, Gutta Percha and Rubber Mfg. Co. of Toronto, Ltd., 47 Yonge Street, Toronto, Ont.
Security, Revere Rubber Co., Chelsea, Mass.
Star, Canadian Rubber Co., Notre Dame Street and Papineau Avenue, Montreal, Can.
Tuebor, New Jersey Car Spring and Rubber Co., Wayne and Brunswick Streets, Jersey City, N. J.
2-X-L, Mechanical Rubber Co., Cleveland, O.

HOSE, Unlined Linen.

Unlined Linen Fire Hose for use inside buildings constructed in accordance with National Fire Protection Association specifications and examined and tested at factories under the supervision of Underwriters' Laboratories, Inc., has attached to each length label reading:



The following companies are equipped to supply this material. Members are advised to give preference to hose which bears the label referred to.
Malden, Mass., Chas. Niedner's Sons Co., 10-20 James Street.
New York, Eureka Fire Hose Mfg. Co., 13 Barclay Street.

HYDRANTS.

The hydrant manufactured by the following company has been examined and tested and pending the adoption of revised specifications for construction of devices of this class is recommended for use in connection with mill yard and other private underground fire mains. Service record generally satisfactory.

Indian Orchard, Mass. Chapman Valve Mfg. Co.

PAINTS, FIRE RETARDANT.

The so-called "cold water" paints listed below have been examined and tested.

These coatings for wood and other similarly combustible building materials which come under this class, or property so coated, should in no sense be considered as "fire-proof." Their use is preferable to leaving the material uncoated because they retard the spread of fire over combustible surfaces and are particularly desirable in lieu of varnish, shellac, or oil finish, which latter serve to rapidly spread fire. Attention is called, however, to the need of renewal of the coatings in order to maintain the desired conditions.

Whitewash so well meets the requirements of this class that we print formula recommended by the Lighthouse Board of the United States Treasury Department as follows:

"Slake one-half bushel of unslaked lime with boiling water, keeping it covered during the process; strain it and add a peck of salt dissolved in warm water; three pounds of ground rice, put in boiling water and boil to a thin paste; one-half pound powdered Spanish whiting and a pound of clear glue dissolved in hot water; mix these well together and let the mixture stand for several days. Keep the wash thus prepared in a kettle or portable furnace, and when used put it on as hot as possible with painter's or whitewash brushes."

Where possible the coatings should be applied by a hand brush rather than by a spraying machine, thus effecting a better surface, and special care should be exercised not to coat sprinkler heads where installed.

Asbestine. Manufactured by The Muralo Co., New Brighton, S. I., N. Y.
Carey's. Manufactured by The Neptune Paint Co., Hudson, Mich., for The Philip Carey Mfg. Co., Cincinnati, O.
Decorine. Manufactured by Benj. Moore & Co., 111 N. Green Street, Chicago.
Hygienic Fireproof Calcimine. Manufactured by The Rubber Paint Co., 154 W. Van Buren Street, Chicago.
Indeliblo. Manufactured by The Muralo Co., New Brighton, S. I., N. Y.
Indurine. Manufactured by The Muralo Co., New Brighton, S. I., N. Y.
J. M. Manufactured by The Neptune Paint Co., Hudson, Mich., for H. W. Johns-Manville Co., Milwaukee, Wis.
K'Sene. Manufactured by The Muralo Co., New Brighton, S. I., N. Y., for Western Roofing and Supply Co., Chicago.
Lythite. Manufactured by The Muralo Co., New Brighton, S. I., N. Y.
Monarch. Manufactured by Geo. Fletcher & Co., 49-51 N. Ashland Avenue, Chicago.
Nepolite. Manufactured by The Neptune Paint Co., Hudson, Mich.
Retardo. Manufactured by Benj. Moore & Co., Chicago, for Retardo Fire Proof Paint Co., Milwaukee, Wis.

PLAY PIPE.

The National Standard Play Pipe for 2½ inch hose manufactured by the following manufacturer has been examined and tested and approved for use:

New York, Eureka Fire Hose Manufacturing Co.

ROOFINGS.

Certain proprietary roofings listed below have been examined and tested.

These tests indicate that the fire retardant properties of these materials

are inferior to those of slate, metal or good tin-clad roofs, but in a class with those of good slag and good gravel roofs, and superior to those of wooden shingle roofs.

Amatite (Prepared), Barrett Manufacturing Co., 17 Battery Place, N. Y.

Amazon Ready Roofing, (Prepared, 2 and 3 ply), Barrett Mfg. Co., Philadelphia, Pa.

Becker Asphaltum Ready Roofing, (Prepared, 2 and 3 ply), F. Becker Asphaltum Ready Roofing Co., 1510-12 Milwaukee Avenue, Chicago, Ill.

Black Diamond, (Prepared, 2 and 3 ply), Barrett Mfg. Co., 17 Battery Place, N. Y.

Carey's Standard Magnesia Flexible Cement (Prepared), The Philip Carey Mfg. Co., Lockland, Cincinnati, O.

Carbonite (Prepared, 2 and 3 ply), The Heppes Co., 2427 Fillmore Street, Chicago.

Congo (Prepared, 2 and 3 ply), The Buchanan-Foster Co., 504 West End Trust Bldg., Philadelphia, Pa.

Eclipse Rubber (Prepared), Ford Manufacturing Co., Washington and Desplaines Street, Chicago, Ill.

Ehrets (Slag), Warren-Ehret Co., 1202 Land Title Bldg., Philadelphia.

Elaborated Ready (Prepared), Elaborated Ready Roofing Co., 4419 La Salle Street, Chicago.

Flexo (Prepared, 2 and 3 ply), The Heppes Co., 2427 Fillmore Street, Chicago.

Galvanized Rubber (Prepared), Ford Manufacturing Co., Washington and Desplaines Streets, Chicago, Ill.

Genasco Asphalt Composition (4 ply), Barber Asphalt Paving Co., 1243 Stock Exchange Bldg., Chicago, for the Genasco Roofing Co., Chicago.

Genasco (Prepared, Smooth Surface, 2 and 3 ply, Stone Surface, Whitestone and Model, 2 ply), The Barber Asphalt Paving Co., 1243 Stock Exchange Bldg., Chicago.

Granite (Prepared), The Eastern Granite Roofing Co., 1 Hudson Street, New York, N. Y.

Huttig Rubber (Prepared, 2 and 3 ply), Barber Asphalt Paving Co., 1243 Stock Exchange Bldg., Chicago, for Huttig Mfg. Co., Muscatine, Iowa.

Indruroid (Prepared, 2 and 3 ply), H. F. Watson Co., Erie, Pa.

Malthoid (Prepared, 2 and 3 ply), The Paraffine Paint Co., Merchants Exchange Bldg., San Francisco, Cal.

Mastic (Prepared), National Mastic Roofing Co., San Francisco, and National Roofings and Materials Co., Edwardsville, Ill.

Mikado (Prepared, 2 and 3 ply), J. A. & W. Bird & Co., 35 India Street, Boston.

No-Tar (Prepared, 2 and 3 ply), The Heppes Co., 2427 Fillmore Street, Chicago.

Paroid (Prepared, 2 and 3 ply), F. W. Bird & Son, East Walpole, Mass.

Protection Brand Asphalt Ready Roofing (Prepared), Asphalt Ready Roofing Co., 136 Water Street, New York.

Rex Flintkote (Prepared, 2 and 3 ply), J. A. & W. Bird & Co., 35 India Street, Boston.

Rhinoceros (Prepared, 2 and 3 ply), Warren Chemical and Manufacturing Co., 17 Battery Place, New York.

Roofrite (Prepared), The Lehon Co., W. 43rd Street, Lincoln to Robey, Chicago.

Rubber (Prepared, 2 and 3 ply), The General Roofing Co., East St. Louis, Ill.

Rubbertex (Prepared, 2 and 3 ply), The Heppes Co., 2427 Fillmore Street, Chicago.

Ruberoid (Prepared, 2 and 3 ply), Standard Paint Co., 100 William Street, New York.

Safety (Prepared), National Roofing Co., Tonawanda, N. Y.

Security (Prepared), National Roofing Co., Tonawanda, N. Y.

Standard Asbestos (Prepared), H. W. Johns-Manville Co., 100 William Street, New York.

Vulcanite (Prepared, 2 and 3 ply), The Patent Vulcanite Roofing Co., 625 S. Campbell Avenue, Chicago.

Walrus (Prepared, 2 and 3 ply), Warren Chemical and Manufacturing Co., 17 Battery Place, New York.

West Coast Ready Rock (Prepared), The West Coast Company, Waukegan, Ill.

SASH LOCK. (See Window Hardware.)

SASH CHAIN. (See Window Hardware.)

SHUTTERS. (See Doors.)

SPRINKLERS, Automatic.

It has not been judged necessary as yet to extend label service to these devices.

The following patterns are approved:

Grinnell Improved 1903. General Fire Extinguisher Co., Providence, R. I.
International, Evans 1902 Model. International Sprinkler Co., 517 Arch Street, Philadelphia, Pa.
Manufacturers "C." Manufacturers' Automatic Sprinkler Co., 1-11 Liberty Street, New York.
Neracher Improved 1902. General Fire Extinguisher Co., Providence, R. I.
Niagara-Hibbard, issue B, 1904. Niagara Fire Extinguisher Co., Akron, O.
Phoenix, issue A, 1905. Phoenix Fire Extinguisher Co., 1028-33 First National Bank Bldg., Chicago.
Rockwood, issue A. Worcester Fire Extinguisher Co., 4 Arch Street, Worcester, Mass.

SPRINKLER SUPERVISORY DEVICES.

For use in connection with approved central station systems.

Consists of apparatus for transmitting signals when gate valves are closed or open; when water in tanks falls below or is restored to predetermined level; when pressure in air tanks falls below or is restored to predetermined amount; when water in tanks falls below or rises above predetermined temperatures. Also apparatus for connection with water flow valves to transmit water flow signals (where there is a flow of water equal to that of one or more sprinklers) and to withhold signals from water surges or variable pressure.

A. D. T. Devices for attaching to Central Station Signaling Systems for supervisory maintenance and operation of sprinkler equipments. Manufactured by Automatic Fire Protection Company, New York and Chicago.

VALVES, ALARM. (See also Sprinkler Supervisory Devices.)

No appliances meeting all of the requirements desirable for this service have as yet been shown.

Ratings covering the patterns found in common use have been issued as follows:

Evans Variable Pressure 1902 model. Manufactured by International Sprinkler Co., 517 Arch Street, Philadelphia. Not standard. Field experience limited, but fairly satisfactory where device has been properly installed, correctly adjusted and intelligently supervised.
Grinnell English Pattern, Variable Pressure (Swing check for Straightway type). Manufactured by General Fire Extinguisher Co., Providence, R. I. Not standard. Field experience fairly satisfactory where device has been properly installed, correctly adjusted and intelligently supervised.
Grinnell branch (old type called Harkness Tee). Manufactured by General Fire Extinguisher Co., Providence, R. I. Not standard. Field experience, where central station and Local Board supervision obtains and valves are under constant pressure, reported as fairly satisfactory.
Manufacturers. Manufactured by Manufacturers Automatic Sprinkler Co., 1-11 Liberty Street, New York. Not standard. Field experience with an improved type of this valve in one locality, where central station and Local Board supervision obtains and valves are under constant pressure, reported as fairly satisfactory.

Niagara. Manufactured by Niagara Fire Extinguisher Co., Akron, O. Not standard. Field experience with an improved type of this valve in one locality, where central station and Local Board supervision obtains and valves are under constant pressure, reported as fairly satisfactory.

VALVES, DRY PIPE.

The following dry pipe valves are approved for use:

Grinnell Straightway. The General Fire Extinguisher Company, Providence, R. I.
International (No. 4 Evans Model), 4-inch size. International Sprinkler Co., Philadelphia, Pa.
Manufacturers, Model 3, 4-inch size. Manufacturers Automatic Sprinkler Co., New York, N. Y.
Rockwood, 4-inch and 6-inch sizes. Worcester Fire Extinguisher Co., Worcester, Mass.
Phoenix Mechanical, 5-inch size. Phoenix Fire Extinguisher Co., Chicago, Ill.

WATCHMEN'S TIME RECORDING APPARATUS.

Boxes for Central Station Systems.

Combined watchmen's Call and Fire Alarm Boxes for use in connection with approved normally closed circuit Central Station Watchmen's Time Recording Apparatus, constructed in accordance with National Fire Protection Association specifications and examined and tested at factories under the supervision of Underwriters' Laboratories, Inc., have labels fixed to the outside of clock cases reading:

The following companies are equipped to supply these devices:
American District Telegraph Co., 195 Broadway, New York.
Chicago Electric Protective Co., 147 Fifth Avenue, Chicago.
Signalphone Co., Milwaukee, Wis.

Before the extension of the label service to this industry approvals were granted to certain boxes manufactured by the foregoing and one other company as follows:
Viaduct Mfg. Co., 10 S. Howard Street, Baltimore, Md.

Apparatus for Local or Private Systems.

Watchman's Stationary Clocks constructed in accordance with National Fire Protection Association specifications and examined and tested at factories under the supervision of the Underwriters' Laboratories, Inc., have label fixed to outside of clock cases reading:

and a decalcomania transfer is applied to the outside of the magneto cases reading:

The following companies are equipped to supply these devices:

American Watchman's Time Detectors Co., 2069 Fourth Street, Cleveland, O.
American Watchman's Time Detectors Co., 234-5 Broadway, New York.
Eco Magneto Clock Co., 289 Congress Street, Boston.
E. A. Hamilton & Co., Grand Rapids, Mich.
Holtzer-Cabot Electric Co., Brookline, Boston, Mass.
E. Howard Clock Co., 373 Washington Street, Boston, Mass.
Newman Clock Co., (Single Station Clock), Masonic Temple, Chicago.
Simplex Time Recorder Co., Gardner, Mass.

Before the extension of the label service to this industry approvals were granted to certain clocks manufactured by the foregoing and other companies as follows:
Indianapolis Magneto. Indianapolis Watchman Clock Co., Indianapolis, Ind.
Wakeman's Single Station. Wakeman's Time Recorder Co., Scranton, Pa.

Portable Clocks.

Watchman's Portable Clocks constructed in accordance with National Fire Protection Association specifications and examined and tested at factories under the supervision of Underwriters' Laboratories, Inc., have labels fixed to the inside of clock cases reading:

(*See cut under Local or Private Systems.*)

and a decalcomania transfer is applied to outside of the key boxes reading:

(*See cut under Local or Private Systems.*)

The following companies are equipped to supply these devices:

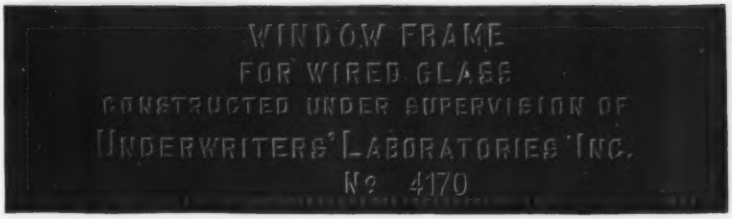
Eco Magneto Clock Co., 289 Congress Street, Boston.
Hardinge Bros., 1034-1036 Lincoln Avenue, Chicago.
E. O. Hausburg, 45 Maiden Lane, New York.
Nanz & Co., 127 Duane Street, New York.
Newman Clock Co., Masonic Temple, Chicago.
The Timekeeper Co., Chicago.

Before the extension of the label service to this industry approvals were granted to certain clocks manufactured by the foregoing and one other company as follows:

New York. Manufactured by J. Schlenker, Germany, for The General Watchman's Time Detectors Co., New York.

WINDOWS.

Metallic Window Frames and Sash glazed with Wired Glass, constructed in accordance with National Fire Protection Association specifications, and examined and tested at factories under the supervision of Underwriters' Laboratories, Inc., have labels riveted to the inside of the window reading:



The following companies are equipped to supply these devices. Members are advised to give preference to windows which bear the labels referred to.

Boston, E. B. Badger & Sons Co., 63 Pitts Street. Double Hung.
Brooklyn, Herrmann & Grace, 671-685 Bergen Street. Pivoted Upper Sash.
Chicago, Grace Cornice Works, 1260 Indiana Avenue. Double Hung.
Chicago, Illinois Roofing & Cornice Co., 329 W. Kinzie Street. Double Hung.
Chicago, Harry C. Knisely Co., 273 S. Canal Street. Double Hung, Pivoted Upper Sash.
Chicago, Knisely Bros., Fifth Avenue and 28th Place. Casement, Double Hung, Pivoted Upper Sash.
Chicago, J. C. McFarland & Co., 27th Street and Fifth Avenue. Double Hung, Pivoted Upper Sash.
Chicago, Jas. A. Miller & Bro., 129 S. Clinton Street. Double Hung, Pivoted Upper Sash.
Chicago, Perkinson & Brown, 111 N. Lincoln Street. Pivoted Upper Sash.
Chicago, E. A. Rysdon & Co., 627-629 W. 41st Street. Double Hung, Pivoted Upper Sash.
Chicago, Sykes Steel Roofing Company, 112-120 W. 19th Place. Double Hung, Pivoted Upper Sash.
Chicago, Voigtmann & Co., 42-54 E. Erie Street. Double Hung, Pivoted Upper Sash, Pivoted Lower, Pivoted Upper and Lower, Single Pivoted, Top Hinged Sash, and Stationary.
Cincinnati, Thomas Lee, 128 W. Second Street. Double Hung, Pivoted Upper Sash.
Cincinnati, Witt & Brown, 215 W. Third Street. Pivoted Upper Sash.
Cleveland, Riester & Thesmacher Co., 1514-1526 W. 25th Street. Pivoted Upper Sash.
Kansas City, J. A. Ritzler Cornice & Ornament Co. Double Hung.
Kansas City, Henry Weis Cornice Co., 1811-1815 Wyandotte Street. Pivoted, Double Pivoted, Single Pivoted, Stationary, Double Hung.
Kansas City, Zahner Manufacturing Co., 12 West 10th Street. Double Hung, Pivoted Upper Sash.
Milwaukee, Wis., Biersach & Niedermeyer Co., 216-220 Fifth Street. Pivoted Upper Sash.
Milwaukee, Wis., Consolidated Sheet Metal Works, 661-673 Hubbard Street. Pivoted Upper Sash, Double Hung.
New York, Voigtmann & Co., 427 W. 13th Street. Pivoted Upper Sash, Double Hung.
Philadelphia, David Lupton's Sons Co., Allegheny Avenue and Tulip Street. Casement, Double Hung, Pivoted Upper Sash, Pivoted Upper and Lower Sash, Single Pivoted, and Stationary.
Philadelphia, J. S. Thorn Co., 20th and Allegheny Avenue. Double Hung, Pivoted Upper Sash, Casement.
Salem, O., W. C. Mullins Co. Double Hung, Pivoted Upper Sash, Pivoted Lower Sash, Pivoted Upper and Lower Sash, Single Pivoted, Stationary.
St. Louis, Eagle Metal Works Co., 1510-1512 Clark Avenue. Double Hung.
St. Louis, Hopmann Cornice Co., 2571-2573 Benton Street. Double Hung.
St. Louis, Mesker & Bro., 421-519 S. Sixth Street. Pivoted, Double Pivoted, Single Pivoted, Double Hung, Stationary.

St. Louis, Powers & Boyd Cornice and Roofing Co., 3614-3616 Laclede Avenue. Double Hung.
St. Louis, Ruth Cornice Works, 4298 Page Avenue. Double Hung.
St. Louis, Von Der Au & Cluss Mfg. Co., 2404-2408 South Jefferson Avenue. Double Hung.

WINDOWS, Hardware.

Sash Locks.

Malleable iron locks examined at factory and passed by Underwriters' Laboratories' Inspectors have attached to each box of twelve locks, sealing the box, label reading as follows:

The following manufacturer is equipped to supply these devices. Members are advised to give preference to the locks which bear the label referred to.
Chicago, Payson Manufacturing Co., 1319 Jackson Boulevard.

Sash Chains.

The following sash chain in sizes Nos. 80, 100, 130 and 250, has been examined and tested and is approved for use on metallic window frames and sash with wired glass as follows:

Size No. 80 for sash weighing not more than 90 pounds.
Size No. 100 for sash weighing not more than 120 pounds.
Size No. 130 for sash weighing not more than 160 pounds.
Size No. 250 for sash weighing not more than 210 pounds.

Community Guaranteed Sash Chain. Oneida Community Limited, Oneida, New York.

WIRED GLASS.

It has not been judged necessary to extend label service to this material up to the present time. Distinctive marks applied by the companies themselves to that portion of their product constructed in accordance with the standard (without constant supervision of such marking by the Laboratories) has been considered acceptable.

New York, N. Y. Mississippi Wire Glass Co.
This company claims exclusive right to the use of hexagonal mesh in wired glass. Decision of the Court of last resort on this claim is not yet obtained. In the meantime sub-standard wired glass using hexagonal mesh is occasionally found on the market. Members should therefore make careful inspection of this type of product before acceptance.
Philadelphia, Pa. Continuous Glass Press Co.
Marking: Consists of a strand of the wire mesh made by twisting two No. 27 gage wires together, and spacing such distinctive cabled strand approximately 10 inches apart in each sheet of glass manufactured.
Streator, Ill. Western Glass Co.
Marking: Consists of five loops at each vertical strand of wire mesh.
Pittsburg, Pa. Arbogast-Brock Glass Co.
Marking: A U-shaped piece of wire, 3-16 of an inch in height, embedded near one corner or spaced about 15 inches apart vertically and horizontally in each light.

W. H. MERRILL, *Secretary.*

LIST OF MEMBERS ELECTED BY THE EXECUTIVE COMMITTEE SINCE LAST FEBRUARY.

MARCH, 1908.

ASSOCIATE.

Mr. W. E. Allis, Inspector, Middle States Inspection Bureau, 58 William Street, New York, N. Y.
Mr. S. S. Barrett, State Agent, Scottish Union & National Insurance Company, P. O. Box 486, Louisville, Ky.
Mr. C. C. Dickinson, Inspector, Northern Assurance Company, 1221 Pierce Building, St. Louis, Mo.
Mr. Percy W. Gedney, City Surveyor, North British & Mercantile Insurance Company, San Francisco, Cal.
Mr. Gessner Harrison, Special Agent, Phenix Insurance Company, 306 American Bank Building, Richmond, Va.
Mr. John Hoover, Special Agent and Adjuster, London and Lancashire Fire Insurance Company, 1033 Grand Avenue, Dayton, O.
Mr. Robert Lecky, Jr., Vice-President and Secretary, Virginia State Insurance Company, Box 837, Richmond, Va.
Mr. V. S. Morriss, Morriss Realty Company, Granite City, Ill.
Mr. Joseph A. Murphy, Special Agent, Aetna Insurance Company, 16 Downs Block, Seattle, Wash.
Mr. E. E. Rice, Secretary, Galveston Board of Underwriters, Galveston, Tex.
Mr. F. W. Shirer, Secretary, West Virginia Fire Underwriters' Association, Wheeling, W. Va.
Mr. C. A. Vlachos, Inspector, Underwriters' Association of Blair, Cambria, Clearfield, Huntingdon and Indiana Counties, Altoona, Pa.
Mr. John H. G. Williams, Inspector, Underwriters' Bureau of Middle and Southern States, 71 William Street, New York, N. Y.
Mr. Hugh I. Wilson, of Huidekoper & Wilson, 321 Walnut Street, Philadelphia, Pa.

SUBSCRIBING.

Mr. Martin Andrews, The King & Andrews Company, 888 Winthrop Avenue, Chicago, Ill.
Catton, Bell & Company, General Agents, Union Assurance Society of London, 320 Sansome Street, San Francisco, Cal.
Mr. Howard J. Force, Chemist, care of D., L. & W. R. R. Company, Scranton, Pa.
A. F. Gallum & Sons, Empire Tannery, Milwaukee, Wis.
Herring-Hall-Marvin Safe Company, 400 Broadway, New York, N. Y.
Mr. Myron H. Hopkins, General Manager, care of The C. W. Thum Company, Grand Rapids, Mich.
Imperial Glass Company, Bellaire, O.
Mr. J. R. Massey, Conneaut Lamp Works, Conneaut, O.
Mr. Chas. W. Miller, Secretary, Jeffrey Manufacturing Company, Columbus, O.
Mr. W. L. Murdoch,, Northwestern Leather Company, Sault St. Marie, Mich.
Mutual Wheel Company, Moline, Ill.
Chas. Niedner's Sons Company, Linen Hose Manufacturers, 10-20 James Street, Malden, Mass.
Mr. R. H. Scott, Reo Motor Car Company, Lansing, Mich.
Mr. A. G. Souther, E. E. Souther Iron Company, St. Louis, Mo.

APRIL, 1908.

ACTIVE.

National Electric Light Association, 29 West 39th Street, New York, N. Y.

ASSOCIATE.

Mr. H. G. Baker, Canadian Fire Underwriters' Association, Conistine Building, Montreal, Canada.
Mr. C. B. Beasom, Engineer and Special Inspector, Associated Factory Mutual Fire Insurance Companies, 31 Milk Street, Boston, Mass.
Mr. W. H. Blood, Jr., representing National Electric Light Association, 147 Milk Street, Boston, Mass.
Mr. C. B. Burke, Special Agent, 308 Walnut Street, Philadelphia, Pa.
Mr. Chas. E. Dox, Manager, London & Lancashire Fire Insurance Company, 171 La Salle Street, Chicago, Ill.
Mr. Wm. B. Goodwin, State Agent, Aetna Insurance Company, 35½ North High Street, Columbus, O.
Mr. Edw. R. Hardy, New York Fire Insurance Exchange, 34 Nassau Street, New York, N. Y.
Mr. E. R. Houck, Inspector, Fire Underwriters' Inspection Bureau, 467 Colman Building, Seattle, Wash.
Mr. Geo. H. Houghton, Insurance Surveyor, Board of Fire Underwriters, San Francisco, Cal.
Mr. Albert G. Prescott, New England Bureau of United Inspection, 71 Kilby Street, Boston, Mass.
Mr. H. E. C. Rainey, New York Fire Insurance Exchange, 32 Nassau Street, New York, N. Y.
Mr. H. Stainton, Inspector, Canadian Fire Underwriters' Association, 34 St. Denis Street, Montreal, Quebec, Canada.
Mr. C. H. Warner, 514 California Street, San Francisco, Cal.

SUBSCRIBING.

The Manhattan Rubber Manufacturing Co., Passaic, N. J.
Mengel Box Company, Louisville, Ky.
Mr. Chas. Nuhring, Chas. Nuhring & Bro., 907 Walnut Street, Cincinnati, O.
The Peerless Motor Car Company, Automobiles, Cleveland, O.
Mr. J. F. Robinson, Assistant Secretary, American Car & Foundry Company, Lincoln Trust Building, St. Louis, Mo.

MAY, 1908.

ACTIVE.

American Society of Heating and Ventilating Engineers, P. O. Box 1818, New York, N. Y.
National Association Factory Mutual Insurance Companies, 706 Traction Terminal Building, Indianapolis, Ind.
National Association Master Composition Roofers of United States, 17 Battery Place, New York, N. Y.
Suburban Fire Insurance Exchange, 32 Nassau Street, New York, N. Y.

ASSOCIATE.

Mr. K. W. Adkins, Electrical Inspector, Missouri Inspection and Survey Bureau, 216 American Bank Building, Kansas City, Mo.
Mr. William E. D. Baldwin, Secretary, Ottawa Fire Insurance Company, 7 Melinda Street, Toronto, Ontario, Canada.
Mr. George Brinley, Inspector, Hartford Fire Insurance Company, Box 46, Albany, N. Y.
Mr. Marland E. Brown, Inspector, Ohio Inspection Bureau, 1011 Outlook Building, Columbus, O.
Mr. Charles R. Clapp, of Ormsby & Clapp, Insurance, Woodstock, Ontario, Canada.

Mr. Harley H. Duley, Sprinkler Inspector, Cincinnati Fire Prevention Bureau, 1403 First National Bank Building, Cincinnati, O.
Director Sisfr. Kulhem, Brandforsakrings aktiebolaget Fennia, Helsingfors, Finland, Europe.
Mr. A. C. McCabe, Special Agent, Smith & Cochran, General Agents, Box 111, Little Rock, Ark.
Mr. T. S. McMurray, Jr., Manager, Indianapolis Fire Inspection Bureau, 1003 Lemcke Building, Indianapolis, Ind.
Mr. R. O. Taylor, Inspector, Northern Assurance Company, P. O. Box 315, Winnipeg, Manitoba, Canada.
Mr. R. S. Tucker, Inspector, Bliss Building, Sandusky, O.

SUBSCRIBING.

Mr. P. G. Kern, Superintendent Southern Division, American District Telegraph Company, Louisville, Ky.
Mr. Colbert A. MacClure, of MacClure & Spahr, Keystone Bank Building, Pittsburg, Pa.
The Upson Nut Company, 607 Garfield Building, Cleveland, O.

Editorials.

The twelfth Annual Meeting of the National Fire Protection Association was held in Chicago, May 26, 27 and 28, in the rooms of the Chicago Board of Underwriters. Owing to the continued illness of President W. W. Dudley, Vice-President Wm. A. Anderson presided.

The following changes were made in the articles of the Association. Article 2 changed to read as follows:

The object of this Association shall be to promote the science and improve the methods of fire protection and prevention; to obtain and circulate information on these subjects, and to secure the co-operation of its members in establishing proper safeguards against loss of life and property by fire.

Article 4 changed to read as follows:—

Article 4. The officers shall be a President, a Vice-President, a Secretary and Treasurer and an Executive Committee of Fifteen.

At the annual meeting in 1908 a President, a Vice-President and a Secretary and Treasurer shall be elected for one year, five members of the Executive Committee for three years, five members for two years, and five members for one year. At each succeeding annual meeting a President, a Vice-President and a Secretary and Treasurer shall be elected for one year, and five members of the Executive Committee for three years each.

4 A and B no change.

Add 4 C.

All officers shall hold office until their successors are elected. Vacancies in office shall be filled by the Executive Committee until the next annual meeting when the Association shall fill the vacancy for the unexpired term in the same manner in which officers are elected.

The following resolution was adopted:

The National Fire Protection Association representing all of the national institutes and societies and underwriting organizations in the United States which have thus far evidenced their interest in the protection of life and property against loss by fire through joining its effort for the general good, has its attention called at this, its twelfth annual meeting, to the disasters by fire which have occurred during the past year, involving a great sacrifice of life and an enormous fire waste, as illustrated by Collinwood school, Boyerstown theatre, and Chelsea and Atlanta conflagrations.

These, following the previous experiences at Baltimore and San Francisco, again serve to emphasize the apparent disregard on the part of the general public, resulting in the loss of hundreds of lives annually and a fire waste of almost a million dollars for every business day.

It is believed that the time has properly arrived when adequate laws, federal, state and municipal, should be enacted and enforced in such a manner as will unquestionably check the enormous inroads upon the material resources of our country.

Therefore, the National Fire Protection Association, in convention assembled, unanimously places itself on record as believing:

(1) That a practical means for the conservation of the natural re-

sources of our country is to be found in the restriction of the destruction of property by fire.

(2) That state legislation, where not now existing, should be enacted at an early date, enabling communities to make proper provision for the supervision and control of building construction and installation of adequate fire protection and prevention measures.

(3) That communities already authorized to make building laws should give their earnest attention to such revision of present ordinances and adoption of new measures as experience has demonstrated to be necessary and advisable.

(4) That buildings where people congregate, such as schools, colleges, theatres, hospitals, asylums, churches, department stores and the like, are peculiarly susceptible to calamitous conditions, and should receive the particular attention of the recognized authorities in the insistence upon superior construction and the introduction of apparatus for the automatic extinguishment of fires.

The report of Secretary Merrill showed that the total membership is now, 1,341, divided as follows: Active, 63; Associate, 896; Subscribing, 380; Honorary, 2. In six years the membership has increased from 236 to 1,341.

The Editor made a brief report covering the work of the past year and asking for the co-operation of members at least to the extent of sending in reports on fires and other information of general interest.

In the Proceedings which will be issued shortly will be a complete report of the meeting, including all discussions and committee reports.

The following officers were elected for the ensuing year:

President, C. M. Goddard, of Boston; vice-president, H. C. Henley, of St. Louis; secretary, W. H. Merrill, of Chicago; Chairman of Executive Committee, H. L. Phillips, of Hartford; Executive Committee: One year, G. W. Cleveland, C. A. Hague, George McFall, H. L. Phillips and Alfred Stone; two years, Albert Blauvelt, W. J. Frederick, C. H. Phinney, M. P. Pierce and W. G. Sanderson; three years, E. B. Creighton, H. E. Hess, C. A. Hexamer, F. E. MacKnight and H. K. Miller.

Attention should be called to the resolution adopted at the twelfth Annual Meeting and given in full above. That the work of our Association and its members has been productive of much good cannot be gainsaid and it could be conclusively proven that properties constructed and protected in accordance with the rules of our Association are much less productive of serious fires than risks that are not so well built or protected. Our experience for instance with isolated properties under sprinkler protection over a period of years shows that the danger of serious fires in such properties has been largely eliminated, and the fact that there are today hundreds of millions of dollars' worth of property thus protected on which the fire loss is very small should greatly encourage us. On the other hand we find that the annual fire loss in this country is increasing rather than diminishing. Serious conflagrations are more frequent rather than less, and what is even of more importance fires in which serious loss of life occur are becoming more and more common.

As fire protection engineers we can point out the way; we can inform

the property owner as to the best method of construction and protection; we can call attention to the danger of serious fires, how they are caused, and point out proper safeguards. *We cannot, however, compel the property owner to give due regard to protection against fire and so long as he is allowed to construct unsafe buildings and not provide proper protection we will continue to have serious fires.*

Does not the solution therefore lie with the public who should see that proper laws are made to improve present properties, make them more safe, and to prevent the further erection of unsafe or improperly protected buildings?

From an engineering standpoint it is entirely feasible to improve and protect buildings so as to make them reasonably safe and in most cases this is not only feasible but can be done at a reasonable expense. It would therefore seem to be entirely proper for the public to insist that where lives or other property are endangered the owner should be compelled to make all necessary improvements either from the standpoint of construction or protection.

There has of late been considerable discussion in the papers as to the danger of conflagrations, and attention has been many times called to the weaknesses which exist in most if not all of our larger cities and towns. In many cases improvements in fire protection, water supplies, fire department, etc., have been made, but seldom do we get to the real root of the evil which is the poorly constructed building, full of inflammable contents, without interior protection, and often of large area or height. Such buildings or perhaps group of buildings, we well know to be oftentimes beyond fire department control, and *they remain a menace to the city until they are individually improved and have proper interior protection.*

Until laws are made and enforced which require the property owner to bring his building up to a certain standard, to provide proper interior protection, such as automatic sprinklers, to protect his wall openings so as to prevent spread of fire from one building to another, etc., we will undoubtedly continue to have serious fires, and as a matter of fact the tendency towards buildings of large height and area with masses of combustible contents may render conditions worse in many cases rather than better, regardless of the fact that other individual risks may be well constructed and protected.

Is it not necessary and right to compel the property owner, who because of unsafe conditions endangers lives and other property, to make such improvements as have been proven to be reasonable and proper, and thereby largely eliminate the danger of a serious fire?

The following paper on "Electricity as Viewed by The Insurance Engineer; Should the American Institute of Electrical Engineers Interest Itself?" was read by President Goddard before the above mentioned Institute at its recent meeting at Atlantic City. This paper appears to be of more than ordinary interest and is reprinted in full.

If news had been received during the last six months of the total destruction of our fleet of battleships on its way to San Francisco, even without any loss of life, what a calamity it would have been considered, and how messages of sympathy would have poured in from all the governments in the world. The value of that

fleet is probably less than $125,000,000; the property loss by the conflagration in the city of San Francisco, toward which that fleet was headed, of $350,000,000 by one fire, brought similar messages because it was an unusual occurrence.

The property loss by fire (in the U. S.) for the year 1907 was $180,000,000; the average annual loss for the last 32 years was $134,000,000; the national debt at its highest point was $2,845,000,000, or a little over two and three-quarters billions; the insurance companies have paid $2,500,000,000 in losses since 1860; the total property loss by fire has been $4,250,000,000 since 1875.

There are approximately three hundred insurance companies doing business in this country, one thousand companies, or more than three times the present number, have failed or been retired since 1850. The three hundred companies have risks outstanding of over $30,000,000,000.

The annual number of fires in American cities average 40 for each 10,000 of population as compared with 8 for each 10,000 population in European cities. The annual per capita loss in Austria, Denmark, France, Germany, Italy and Switzerland varies from 12 cents in Italy to 49 cents in Germany, with an average of 33 cents as compared with $2.47 in the United States.

There is no question but that 50 per cent. of our fires are due to what we technically call "faults of management;" this includes all sorts of easily avoidable conditions that are likely to cause or aggravate fire hazard, a more common word would be "carelessness."

Just after the Collinwood School tragedy, a prominent metropolitan newspaper printed the following editorial on this unnecessary loss of life:

"A spasm of horrified emotion has passed over the country as a consequence of the deaths of a crowd of children in the fire which destroyed the Collinwood School at Cleveland. The horror is natural. It is a credit to the country. But the fire and its results were the natural effects of a succession of causes which discredit the country because they are characteristic of the country. The horror and the sympathy are human; they are common to all civilized communities; the recklessness which caused the unspeakable disaster is American. It has no counterpart elsewhere.

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"The city authorities, the school authorities, all were negligent. Behind their negligence stands the great, gaping negligence of the public, the same negligence that causes annually in the United States more accidental deaths and injuries than three great wars.

"There is terrific loss of life and limb in this country from preventable causes. No other land shows anything like it, or anything approaching it. This is not because of the vastness of our population, but because of its carelessness. We are the most careless people on earth. We permit a looseness of conditions, a recklessness of method, or a method of recklessness which would not be tolerated in Great Britain or Germany or France. This laxity runs on our railroads, pervades our coal mines, meanders in our mills, asserts itself in the slovenliness of our cities and our vacant lots and is traced directly to our homes along the icy sidewalks to our front doors and the doors of our churches and public institutions. The average American cares no more about the conditions outside the walls of his home than he cares about the conditions on the most distant planet. We are indifferent and unashamed. The spasms of public horror are soon over and forgotten. They accomplish nothing."

This arraignment of the American people applies with equal force to our fire loss and ought to bring the blush of shame to every public spirited citizen.

You are familiar with the idea embraced in the first part of the title of this paper, "Electricity as Viewed by the Insurance Engineer," but do not the foregoing facts and figures warrant the second part of that title and demand not only from the electrical engineer but also from all classes of business men a careful and thoughtful consideration of the subject of fire protection and fire prevention? Should not every member of this institute join hands with his fellow members of the National Fire Protection Association, and do his part to stop this appalling destruction of accumulated wealth?

"A penny saved is a penny earned," and while the insurance or fire protection engineer cannot create wealth as do the electrical industries, he can endeavor to lessen the unnecessary destruction of created wealth and thereby prove his right to exist. We cannot fairly throw the whole burden of this work on the insurance com-

panies, their profit would be the same if they did nothing to reduce the fire loss and simply made it a matter of rates.

This is true of every public service corporation, but you men know that your best efforts are given all the time to reducing the cost of production, not solely to increase your profits, but because your great desire is to please your customer by giving him better service at a constantly decreasing cost and with a reasonably remunerative profit for yourselves. Do you not believe that the insurance companies are actuated by just as reasonable, honest, and business-like principles?

The market of the stock exchange is known to be the most sensitive barometer of the financial condition of the country. The prospect of poor crops, and therefore a poor year for the railroads, will cause a drop in prices long before the failure of the crop is assured. Are you surprised that the underwriting interests are equally sensitive, when you consider that the combined capital of the American stock companies in 1906 was $60,000,000 and the insurance at risk was $22,000,000,000, that the net surplus of all American and foreign companies doing business in the United States was $147,000,000 and the insurance at risk was $30,000,000,000? A fire in the congested value district of New York covering an area equalling that of the San Francisco conflagration would wipe out of existence nearly every insurance company doing business in that city. Do you not see, then, that it is but natural for such interests to "view with alarm" every newly introduced agent that may effect unfavorably the fire loss? Do you not realize that when the simple act of a cow kicking over a kerosene oil lamp can result in a Chicago conflagration, that the hazard of kerosene oil lamps is a very different proposition from what it would be if such a careless act on the part of that cow could only result in the destruction of the lamp, or, at least, of the building in which the lamp is located?

What must the fire protection engineer know? There is only one answer—he must know something about almost everything, he must be versed in the construction of buildings, in their equipment with fire protective and fire productive devices; he must know the hazards of all the different manufacturing and mercantile occupancies of such buildings. How can a man familiarize himself with every known business? He cannot. That is why he comes to you for advice. His work must be largely critical and that is the reason he is unpopular. He comes to you and asks you to create, and then to submit your creation to him to criticise; and he tells you this or that feature is likely to produce a fire, so he will have to charge an admission fee if you add your creation to his existing risk. This is unpleasant for you and for him too. He has his own troubles without seeking a quarrel with you.

Cannot you work together? Of course you can. Trust him, you are honest; and he is equally entitled to be considered honest. Talk it over, find out how your pet creation can be changed so as to remain just as attractive to you and become unobjectionable to him. It is your duty as a patriotic citizen of this country to do all in your power to reduce the fire loss. Work for him for that reason and because it will be for your advantage; your assistance will be welcomed, even if your prime motive is not love of the critic or of the insurance companies by whom he is employed.

It is my intention in this paper to direct your attention to the work of the fire protection engineer in a little different light from what you might expect from the title; but you must remember that I am here now not in my capacity as a member of this institute but rather in that of a delegate from a sister engineering society, the National Fire Protection Association, a society of which this institute is an active member. I am here to urge you to make that membership active, not only in name but also in fact, as far as you consistently can in connection with your other and regular professional duties.

I can probably never divorce myself in the minds of many of your members to whom I am personally known, from the insurance or underwriting interests, nor would I do so if I could; that is my life work and must claim my best efforts. In connection with that work, this institute has, I am pleased to say, done able and efficient work, work that has been of great value to the underwriters, and, I firmly believe, of equal value to the great profession which you honor.

This is the first time that the National Fire Protection Association has been formally represented at an annual meeting of this institute, and it seems to me that the time allotted to me in that capacity could not be better occupied than by endeavoring to show in a general way why there must be a close relation, either co-operative or antagonistic, between the electrical and the fire protection engineer. I could, of course, discuss some particular hazard or hazards of electricity as a fire producing agent, but if I can arouse in the membership of this institute a sense of the duty they owe, not to the insurance companies but to mankind in general, so that each will give some thought and attention to electrical fire hazard problems, then we can trust to committees of conference to work out the details of each and all of the individual problems as they arise. Such work must always, in its results, be more or less of a compromise, often taking on a single point much more time than could be given here to the entire subject.

About fifteen years ago I suggested to some of the members of this institute the desirability of active co-operation on the part of the institute in the formulating of the underwriters' rules. But as this is, and should be a conservative body, it was not until 1896, in the National conference, that the institute itself took up this work, although many of its members had given valuable assistance from the outset.

You must admit electricity may be a most serious fire hazard. The possibilities in that direction can hardly be estimated, and I believe that it was a most fortunate thing for the electrical interests that fire underwriters had begun to appreciate the necessity of fire protection before electricity was introduced for lighting and power, so that they immediately began to surround it with necessary and proper restrictions.

I think that no small part of the progress of your art has been due to the fact that in its early days, when the electrical engineer knew little about the fire hazard of electricity, the underwriter, knowing less but fearing much, appeared as an unwelcome but salutary obstructionist and at least caused the matter to be considered and investigated.

Some of the early fittings and methods of installation certainly would seem to justify any fears that the insurance interests may have entertained. I can remember when, back in the eighties, if the notches cut in floor timbers for gas pipes happened to be large enough, they were considered as a providentially prepared place for the wires, one on each side of the pipe. Now, through co-operation between the two parties in interest, how all this has changed; for I can stand here and tell you from the insurance interests that I believe any undue hazard from electricity has been and is being guarded against. You now give to us the safest illuminant and the safest source of power that we have. We welcome you in that you displace the open flame of gas or oil and the fire under the boiler, that you may by small power units do away with much shafting and the inherent liability of hot bearings. In order to retain this good opinion, however, we must continue our co-operation so that as your art progresses in giant strides, we may together keep pace with it in restrictions which shall not obstruct but safeguard its advance.

My great desire has been and is to foster and encourage this co-operation for our mutual benefit; our interests lie in the same direction, we must travel along together and put up with each other's faults whether we will or not. Shall we not walk as companions rather than enemies? Neither of us has a right to all the good things, nor deserves all the bad things; let us share the good things we each have and help each other with the bad things we must meet.

From the National Fire Protection Association, I bring you all a greeting and an assurance of a welcome if you will share their great work. From the underwriting interests, I also bring you greeting and assurance that we like you better as we know you better; but to the ordinary underwriter you represent a strange and unfamiliar creature, electricity, very difficult to comprehend. You do not know what electricity really is yourself, and how should we? It has served its time as a convenient substitute for our old friends, rats and matches and spontaneous combustion; it has proved its usefulness in many ways to us; it is rather erratic and sometimes inclined to stray from the path assigned to it, but on the whole it has improved so much, as it is reaching the age of maturity, that it is no longer of any particular use to us as a bugaboo to scare people with. Shall we not join hands and work together even more closely in the future than we have in the past?

Efficiency of Water Pressures in connection with automatic sprinklers. It hardly needs to be said that for an automatic sprinkler system to be effective it should have adequate water supplies which will deliver water to the system under *good* pressure. In other words there must not only be plenty of water but the pressure under flowing conditions must be sufficient to give a satisfactory discharge and distribution at the sprinkler head.

Without attempting a technical discussion of operating pressures and discharge we have the generally accepted opinion or rule that there should be at least five pounds pressure at the sprinkler head with water flowing. Under this pressure the discharge is figured to be about 12 gallons per minute for ½-inch orifice in a thin plate.

Those who have tested sprinklers under flowing pressures however will probably all admit that from the standpoint of fire extinguishment or control a greater flowing pressure than five pounds is desirable if not necessary, and that 10 to 15 pounds flowing pressure should be secured. Furthermore a study of discharge and distribution seems to show that flowing pressures of over 20 to 25 pounds while discharging more water with greater force have but little real advantage over the intermediate pressure of say 15 to 20 pounds, and the fact that under heavy pressures the water covers larger areas than is called for by the spacing rules, of course means that one sprinkler is trying to do the work of more than one which under ordinary conditions is not generally considered to be of any advantage.

The **flowing pressure** should not of course be confused with the **static pressure** or gage pressure with no sprinklers operating, and even with only one sprinkler open there will be some loss of pressure due to friction in the pipes, this loss of course being negligible if the sprinkler happens to be located on a large pipe, and the loss is only slight even if on the end of a line of sprinklers.

The standard pipe sizes and arrangement are designed to feed a reasonable number of sprinklers with a minimum friction loss at the same time giving due regard to the expense of the piping. In the older systems the pipe sizes were smaller and the loss of pressure due to friction consequently was greater.

While therefore the difference between the static pressure and the flowing pressure will vary considerably according to number of sprinklers opened, pipe sizes, location of sprinklers as regards feed mains, branch lines, etc., and also of course varies for each particular sprinkler, we know that there is an appreciable loss of pressure even with the present standard system in case several sprinklers open and therefore some allowance must be made for friction loss in order to be on the safe side.

As an example of low static pressures we have the older gravity tanks located 10 to 12 feet above the top line of sprinklers and giving static pressure of from 8 to 10 pounds according to the height of the tank. Experience in actual fires has shown that where a number of sprinklers open, the friction loss is sufficient to render at least a portion of the sprinklers ineffective.

In an attempt to secure some data from the fire reports on the efficiency of water pressure we have compiled Table 15 (see Fire Record of various classes in the Bulletins and Quarterlies) this giving the number of fires, average pressures, average number of sprinklers opened, etc. The

following shows the combined results of all classes of risks so far reported upon and covering a total of 1669 fires in sprinklered risks.

Efficiency of Water Pressures.	Number of fires	Per cent. of fires	Average Pressure	Average number Sprinklers opened	Number of Fires.			Per Cent. of Fires.		
					Extinguished fire (or practically extinguished)	Held fire in check	Unsatisfactory	Extinguished fire (or practically extinguished)	Held fire in check	Unsatisfactory
Less than 15 lbs.,	101	6	10	6.6	47	36	18	47	36	18
15 to 24 inclusive,	200	12	19	7.8	117	69	14	58	34	7
25 to 49 inclusive,	348	20	38	7.2	219	101	28	63	29	8
50 and over,	1020	61	79	7.8	740	227	53	73	22	5
Total,	1669		59	7.6	1123	433	113	67	26	7

It will be noted that we have divided the pressures into four general classes namely: Less than 15 pounds, 15 to 24 inclusive, 25 to 49 inclusive, and over 50 pounds.

By referring to the third column it will be seen that the average pressures for each class are approximately 10, 20, 40 and 80, these figures being easy to remember.

The fourth class shows the average number of sprinklers opened under each of these average pressures and, contrary perhaps to general opinion, it is found that somewhat less sprinklers open under light pressures than under heavy, the figures however being approximately the same for all pressures and leading to the conclusion that other features than pressure have more effect on the number of sprinklers opened. It also must be borne in mind that these figures for average number of sprinklers opened do not include unsatisfactory fires where fire is not controlled by the sprinklers. In other words the tables tend to show that for fires which are properly controlled by the sprinklers the average number of sprinklers opened varies but slightly for different pressures.

Passing to the last three columns showing per cent. of fires extinguished, held in check, and unsatisfactory we find that better results are obtained from the heavy pressures than from the light pressures, and while in many cases there are other influences than pressure affecting the control, as well as many instances where the pressure has no influence at all (such as closed gate valves for instance) nevertheless if the number of fires are sufficiently large, the law of averages will tend to even up these figures and the tables should be at least a guide.

The last column gives the percentage of unsatisfactory fires for each average pressure and it will be noted that this percentage is much higher with the lowest average pressure, i. e., 18%, than with the higher pressures which run from 5 to 8% the best showing being with pressures over 50 pounds. This is what might be expected and the comparative uniformity for all pressures over 15 pounds would tend to show that there is little to be gained in having 50 pounds over say 20 to 25 pounds. So far as the reports are concerned, the pressure noted is generally the static pressure so that the actual working pressures must average considerably less.

The third column from the last gives percentage of fires extinguished at once by the sprinklers (or practically so) being a record of perfect work and here again we find the best record at the higher pressures, namely 73% for the pressure over 50 pounds and 47% for pressures less than fifteen pounds.

It must be remembered that only a portion of the fires reported have been tabulated by occupancy classes so that the above table will be more conclusive when the tabulations are completed.

Shoddy Mills---Fire Record.

MANUFACTURING OF WOOL SHODDY.

Total Number of Fires, 90.

1. CLASSIFICATION OF CAUSES.

Common Causes.

LIGHTING. Number of fires, 1.
Short circuit of electric light wires by electrician.
HEATING. Number of fires, None.
POWER. Number of fires, 3.
Hot journal on shafting, 2 fires.
Ignition of oily flyings inside of wooden pulley.
BOILER (or fuel). Number of fires, None.
RUBBISH (or sweepings). Number of fires, 1.
Originated in box of cotton threads and dirt.
OILY MATERIAL. Number of fires, None.
SMOKING. Number of fires, None.
LIGHTNING. Number of fires, None.
LOCOMOTIVE SPARKS. Number of fires, 1.
MISCELLANEOUS. Number of fires, None.

Special Hazards Causes.

BALED RAGS OR SHODDY. Number of fires, 3.
Spontaneous combustion in shoddy stock.
Oily waste mixed in cotton waste.
Unknown in bale of shoddy.
DUSTERS. Number of fires, 3.
Foreign substance in cloth caused explosion in blower pipe.
Foreign substance striking fire in duster.
Spark from duster.
CARBONIZING (Dry Process). Number of fires, 2.
Spark from carbonizing furnace drawn into fan used to exhaust fumes from room.
Spontaneous combustion in carbonizing machine, dry process.
CARBONIZED STOCK DRYERS. Number of fires, 17.
Steam pipes ignited combustible material, 4 fires.
Dust and lint on steam pipes in Kitson dryer.
Steam pipes ignited partition in dryer.
Dust or lint on steam pipes in dryer.
Steam pipes in table dryer in contact with frame partition.
Overheating or ignition of stock in dryer, 7 fires.
Caused by carbonizer dryer.
Started on table dryer.

Cotton waste under floor ignited from constant heat from textile dryer above.
Hot bearing at fan in dryer.
Unknown in dry room, 2 fires.

PICKERS (including Lumpers). Number of fires, 33.
Foreign substance passing through picker, 17 fires.
Friction in picker, 10 fires.
Foreign substance in stock passing through lumper picker, 3 fires.
Spark from broken picker tooth.
Caused by picker, 2 fires.

GARNETS. Number of fires, 8.
Foreign substance in stock passing through garnet, 6 fires.
Started in "licker-in" roll to garnet machine.
Unknown in shoddy around machine.

CARDS. Number of fires, 7.
Foreign substance in stock passing through card, 4 fires.
Foreign substance in stock passing through "licker-in" rolls of card.
Spontaneous combustion of stock in feed to card.
Started at carding machine.

Summary.

Common Causes.

	No. of Fires.	Per Cent. of Whole.
Lighting	1	1.3
Heating	0	0
Power	3	3.8
Boiler (or fuel)	0	0
Rubbish (or sweepings)	1	1.3
Oily Material	0	0
Smoking	0	0
Lightning	0	0
Locomotive Sparks	1	1.3
Miscellaneous	0	0
Total	6	

Special Hazards.

Baled Rags or Shoddy	3	3.8
Dusters	3	3.8
Carbonizing (Dry Process)	2	2.5
Carbonized Stock Dryers	17	21.5
Pickers (including Lumpers)	33	41.8
Garnets	8	10.1
Cards	7	8.9
Total	73	

	No. of Fires.	Per Cent. of Whole.
Common Causes	6	8
Special Hazards	73	92
Total	79	
Incendiary	0	
Exposure	0	
Cause Unknown Fires	11	
Total Shoddy Mill Fires	90	

2. DETAIL OF CAUSES.

Common Causes.

S-1958. This fire can be classed as a hot box fire, although most of the fire was in the dry room over the room where bearing is located. Fire ran up belt hole in floor and spread rapidly in dry room owing to the fine dust which comes from the carbonized rags; this fine dust probably accounts for the large number of sprinklers opened. Some idea can be gained of the rapidity of the flames from the fact that a workman was inside one large dryer spreading rags on the screen and the first thing he knew the room was on fire, and he made his escape through a window as quickly as possible. There are four large dryers in dryer room constructed of wood having tinned ceilings, each dryer has automatic sprinklers inside and also under screens and a line of heads inside. Although sprinklers were somewhat corroded they operated properly.

Special Hazards.

S-2418. Fire started about nine o'clock a. m. caused by hot bearing in fan of dryer. There were three dryers covered with stock which had been dried and same were left open; also open windows on the river side of the mill which caused a heavy draught, carrying the fire over and through the stock contained in the three dryers making a hot and quick fire. A man near the dryer where the fire started saw where the fire was and immediately took the belt off the fan, stopping same, and attempted to throw water on the fire from the fire pail which hung on the dryer but the smoke was so dense he was unable to find the pail. Forty sprinklers opened and held the fire fairly well, although there was metal covering over the dryers and under the ceiling joists, the fire getting in between same where the sprinklers could not reach it.

S-4246. Mixed rags from acid tank had been placed in dryer about 4.30 p. m. The dryers are wooden boxes about 28′ long by 6′ wide and 5′ deep. One end contains some steam coils and a small fan, the air passing along below the stock, circulating up through it and back again to coils. The stock lies on a coarse mesh screen and

each dryer contains about 1,000 lbs. It generally requires about one and one-half hours to dry the stock before the carbonizing begins, the whole taking about three hours.

The fire started in the dryer next to the west wall of building in the end farthest from the fan. The mill had shut down a half hour before and the fan and steam were shut off. As is the custom when stock is left in the dryer over night, the doors in the sides were left open to let steam pass out. The watchman had been through the room immediately after six o'clock and found things all right. A half hour later he smelled smoke and on coming up stairs found the dryer all afire. He ran to the boiler house and sounded whistle which brought the men and four hose streams were brought into building, the sprinklers then being in operation. The fire was put out in fifteen minutes. If the sides of the dryer had been closed the four sprinklers inside would probably have held it but the heat passed out rapidly and opened up ten heads on the ceiling. The dryer was badly burned. It was made of wood one-half inch thick.

S-4326. Fire occurred in dry process carbonizing room. It is believed that a spark from the carbonizing furnace got into fan used to draw fumes from the room.

S-5449. Fire started in wood box which contains steam coils that supplies heat for the carbonizing dryer in one-story brick section. It was undoubtedly caused by steam pipes coming in contact with wood partition, charring wood and finally bursting into flame. Assured say steam never gets higher than 180° and that foreman of room claims he looked at thermometer about ten minutes before fire occurred and that it was then 160°. Although top of box was open for a distance of eighteen inches below roof, there was ample opportunity for heat to accumulate in box and reach ignition point. The wonder is that fire has not occurred here before as practically all of the steam pipes in box were in contact with partition. Dryer was in operation at the time, but as fire started next to partition about two feet above fan and had a dry charred partition to feed on it quickly spread upwards and was much encouraged in this direction as there happened to be a small unused belt hole directly over top of steam box and fire spreading up through this hole to outside of wood wall of main building spread up through inside of wood sheathing around walls and ceiling of two dry rooms on the second floor of main building and then to attic of adjoining building. Fire was fanned, and must have increased much more rapidly on this account, by the fans at opposite end from were fire entered dryer on second floor. If foreman had shut down these fans and turned on steam jet under one of the dryers, fire could probably have been extinguished without the heavy water damage.

3. ROOMS IN WHICH FIRE OCCURRED.

	Special Hazards.		Common Causes.		Unknown Incendiary Exposure.		Total Fires.	
	No. of Fires.	Per Cent.	No. of Fires.	Per Cent.	No. of Fires.	Per Cent.	No. of Fires.	Per Cent.
Storage	1	1	..	..	5	45	6	7
Sorting	..	..	1	17	..	..	1	1
Dusting	3	4	1	17	1	9	5	5
Carbonizing	3	4	..	..	..	..	3	3
Drying (Carbonized Stock)	17	23	1	17	1	9	19	21
Picking	33	45	1	17	2	18	36	40
Garneting	9	12	..	..	2	18	11	12
Carding	7	10	2	33	..	..	9	10
Total with data given	73		6		11		90	
No data	0		0		0		0	
Total	73		6		11		90	

4. DAY OR NIGHT. (Day Fires 6 a. m. to 6 p. m.)

	Special Hazards.		Common Causes.		Unknown. Incendiary, Exposure		Total Fires.	
	No.	Per Cent.	No.	Per Cent.	No.	Per Cent.	No.	Per Cent.
Day	24	33	3	50	6	55	33	37
Night	49	67	3	50	5	45	57	63
Total with data given	73		6		11		90	
No data	0		0		0		0	
Total	73		6		11		90	

5. PLANT IN OPERATION.

	Special Hazards.		Common Causes.		Unknown. Incendiary, Exposure		Total Fires.	
	No.	Per Cent.	No.	Per Cent.	No.	Per Cent.	No.	Per Cent.
Plant in operation	60	85	4	67	5	45	69	78
Plant not in operation	11	15	2	33	6	55	19	22
Total with data given	71		6		11		88	
No data	2		0		0		2	
Total	73		6		11		90	

6. HOW DISCOVERED.

	Special Hazards.		Common Causes.		Unknown. Incendiary, Exposure		Total Fires.	
	No.	Per Cent.	No.	Per Cent.	No.	Per Cent.	No.	Per Cent.
Employee	56	80	4	67	5	45	65	75
Watchman ...	10	14	1	17	2	18	13	15
Thermostat ...	1	1	0	0	0	0	1	1
Sprinkler Alarm	2	3	1	17	2	18	5	6
Outsider	1	1	0	0	2	18	3	3
Total with data given	70		6		11		87	
No data	3		0		0		3	
Total	73		6		11		90	

SPRINKLER FIRE RECORD.

7. EFFECT OF SPRINKLERS.

	No. of Fires.	Per Cent. of Whole.
Extinguished or practically extinguished fire.....	44	55
Held fire in check	25	31
Unsatisfactory	11	14
Total	80	
No Claim	29	36
Small Loss	44	55
Large Loss	7	9
Total	80	

8. DETAILS OF UNSATISFACTORY SPRINKLER FIRES.

2411. Cincinnati, Ohio. May 2, 1903. Brick, joist constructed. Fire started in second floor rear occupied for picking. Fire spread very rapidly and owing to weak water supply was not controlled by the sprinklers. Heavily ladened floors caused building to collapse. Hibbard 1895 sprinklers, dry system, Grinnell dry valve. Water works 42 pounds and 3,500 gallon gravity tank. It appears that the town water was weak at time of fire.

Summary: Weak water supply.

4037. Newton Lower Falls, Mass. May 25, 1905. Fire in carbonized stock drying room. Six Grinnell glass disc sprinklers failed to open because of corrosion. Fire was controlled by hose streams with the help of neighboring sprinklers which operated.

Summary: Corroded sprinklers.

4326. Cleveland, Ohio. June 25, 1905. Fire occurred in carbonizing room, probably caused by spark from carbonizing furnace, dry process. Sprinklers were badly corroded and only two operated. Fire spread to roof and was finally controlled by hose streams.

Summary: Corroded sprinklers.

4195. Collinsville, Mass. September 15, 1905. Large five-story brick mill constructed building, occupied as a wool shoddy mill, was practically a total loss. Risk was equipped with Grinnell glass disc sprinklers supplied by a 1,000 gallon automatic pump with second supply of another 1,000 gallon pump and a standpipe. Fire apparently started on two floors at about the same time and was not at once controlled, possibly due to obstruction from stock. Later the water was shut off sprinklers and reserved for hose streams, this allowing fire to spread to other floors. For further details see Bulletin No. 11, October, 1905. Fire No. 161, page 28.

Summary: Water shut off before fire was out.

4253. Cohoes, N. Y. October 5, 1905. Fire started on fifth floor of mill occupied as garnet room. Sprinklers were supplied by city water and small gravity tank. The city water was reduced by opening a hydrant on a six inch dead end main and the pressure from tank was so light that it was of little effect. Fire spread rapidly and opened up a large number of sprinklers, spreading also to other floors.

Summary: Weak water supplies.

4435. Newton, Mass. December 23, 1905. Fire occurred in picker room. Water was shut off sprinklers on account of cold weather. Loss estimated at about $10,000.

Summary: Water shut off.

3475. Cohoes, N. Y. December 30, 1905. Fire occurred in garnet room. Risk equipped with Grinnell issue "C" sprinklers, wet system, supplied by city water only. At time of fire there was a break at the pumping station so that the pressure in mains was only about 25 pounds instead of 60 as ordinarily. Pressure was increased later on but fire had spread beyond control of the sprinklers.

Summary: Poor water works supply.

5576. Philadelphia, Pa. December 7, 1906. Fire occurred on second floor occupied as a rag picker room. Risk equipped with Grinnell issue "A" sprinklers, wet system, supplied by gravity tank, steam pump and steamer connection. Gravity tank had just been erected and was out of service at time of fire. Pump was started later and steamer connection was also used.

Summary: Gravity tank out of service.

5608. West Fernwood, Pa. January 24, 1907. Fire occurred in card room, first floor, due to electrician short circuiting a rosette while making repairs to the lighting system. Risk was brick of joist construction, cut-off in several sections with fair to poor fire doors. Building equipped with Grinnell glass disc sprinklers, forty in room, old standard, wet system supplied by 6,500 gallon gravity tank giving eighteen pounds pressure on sprinklers that operated. There was also a small steam pump of 250 gallon capacity drafting from a pond. Fire in card room spread quite rapidly and sprinklers failed to hold it. It gradually spread to second floor and was finally checked by hose streams, the fire doors preventing spread of fire to other sections of mill.

The failure of the sprinklers can be attributed to rather light water pressure and weak water supplies, together with obstruction from

cards, scant spacing, there being but one line in a twelve foot bay, joist construction. Fire spread under the cards and along the floor joists. In all about 86 heads opened. The sprinklers retarded the fire and without them risk undoubtedly would have been a total loss so far as section in which fire occurred is concerned.

Summary: Weak water supplies.

5633. Little Falls, N. Y. February 22, 1907. Fire occurred in garnet room, second floor. It appears that water was shut off sprinklers for some unknown reason and risk was destroyed.

Summary: Water shut off.

7005. Cincinnati, Ohio. March 23, 1908. Fire occurred in one-story frame building used as a dry house. Water was shut off at time of fire due to cold weather.

Summary: Water shut off.

9. DETAILS OF LARGE LOSS SPRINKLER FIRES. (Where sprinkler control is satisfactory.)

1449. Philadelphia, Pa. Fire started in concealed space above board ceiling directly over the front end of boiler and under the card room on second floor. Six sprinklers opened and held the fire in check but could not extinguish it. Loss approximately $23,000.

Summary: Concealed space.

10. POINTS OF INTEREST FROM SPRINKLER FIRE REPORTS.

Automatic Sprinklers.

4977. The sprinklers directly over the carbonizer were badly corroded and failed to operate right. Fire burned through roof.

Floor Openings.

721. Fire started in or around carbonizer and burned down through belt holes to floor below.

Gate Valves.

5854. Water was turned off by fire department, pipes drained, and risk left without protection until the next morning.

Obstruction to Distribution.

4253. This fire shows that with cards and garnets having the Bramwell feed, a stock fire is as apt to occur at the licker-in rolls as at the feed, and that such machines are adequately protected only when there is an automatic sprinkler directly over and as near as practicable to hood of the Bramwell feed; and it is reasonable to suppose that had machines in this risk been so equipped the fire would have been confined to over and around the machine where it started.

Standpipe and Hose.

2814. Three standpipe streams were used in addition to the sprinklers and fire was put out without an alarm being turned in to fire department.

Unsprinklered Portions.

1948. Fire started in picker-room and was blown into gauze room and from there spread to passway. Picker room and passway were not sprinklered.

11. NUMBER OF SPRINKLERS OPENED.

No. of Sprinklers Operating.	Extinguished Fire. No. of fires.	Extinguished Fire. Per cent.	Held Fire in Check. No. of fires.	Held Fire in Check. Per cent.	Unsatisfactory. No. of fires.	Total. No. of fires.	Total. Per cent.	No. of Sprinklers Operating.	No. of fires.	Per cent. of whole.
1	20	45	1	4	..	21	27	1	21	27
2	4	9	2	8	1	7	9	2 or less	28	35
3	5	11	3	12	..	8	10	3 or less	36	45
4	3	7	..	..	..	3	4	4 or less	39	49
5	1	2	..	..	..	1	1	5 or less	40	51
6 to 9 inc.	3	7	5	20	1	9	11	Less than 10	49	62
10 to 24 inc.	6	14	11	44	1	18	23	Less than 25	67	85
25 to 49 inc.	2	5	2	8	3	7	9	Less than 50	74	94
50 and over	..	..	1	4	4	5	6	50 and over	5	
Total	44		25		10	79				

Average number of sprinklers opened not including unsatisfactory, 8.0.

12. ALARM SERVICE.

	Satisfactory. No. of Fires.	Satisfactory. Per Cent.	Failure. No. of Fires.	Failure. Per Cent.	Total.
Watchman alone	13	93	1	7	14
Sprinkler alarm alone	5	100	..	..	5
Thermostat alone	1	100	..	..	1

	Watchman. Satisfactory.	Watchman. Failure.	Sprinkler Alarm. Satisfactory.	Sprinkler Alarm. Failure.	Thermostat. Satisfactory.	Thermostat. Failure.	Total.
Watchman and Sprinkler Alarm	..	1*	1	..	..	..	1
Watchman and Thermostats	..	..	..	..	..	..	..
Sprinkler Alarm and Thermostats	..	..	..	..	..	..	..
Watchman, Sprinkler Alarm and Thermostats	..	..	..	..	..	..	..

*These include fires where sprinkler alarm or thermostats notified the watchman.

Note.—These tables do not include fires where alarm service does or does not operate properly if fire is at once discovered by employee, the alarm service having no bearing on such fires one way or the other.

Points of Interest from Fire Reports as Regards Alarm Service.

3121. Fire was discovered by outsider. Watchman reported to nearest station to origin of fire at 2.00 a. m. No record later. Fire occurred at 5.30 a. m.

4329. Water rotary connected to sprinkler alarm failed to operate. Bell frame had become loosened so that revolving clapper did not strike the gong.

7005. Watchman failed to discover fire as he was in another part of the building when fire occurred.

13. SECONDARY WATER SUPPLIES.

2411. Primary water supply waterworks 42 pounds. Second supply gravity tank. Water works weak at time of fire and gravity tank supply too small. Risk burned.

4195. Primary supply automatic pump. Second supply steam pump and standpipe. Water shut off all supplies during the fire and reserved for hose streams.

5576. Primary supply gravity tank. Second supply steam pump and steamer connection. New gravity tank just installed and not in service. Steam pump and steamer connection used to some advantage but sprinklers did not control the fire.

5608. Primary supply gravity tank. Second supply small steam pump. Sprinklers did not control the fire owing to weak water supplies.

5525. Primary supply weak water works, 26 pounds. Second supply gravity tank. Fifteen sprinklers opened and gravity tank helped maintain the pressure and thereby controlling the fire.

5449. Primary supply gravity tank. Second supply rotary pump. Ten sprinklers opened. Fire got into sheathing and pump was used in maintaining a heavy pressure on sprinklers and was of considerable service.

14. EFFICIENCY OF WATER SUPPLIES.

Primary Water Supply.	Number of fires	Per cent. of fires	Average Pressure	Average number Spkrs. opened	Per Cent. of Fires. Extinguished fire (or practically extinguished)	Held fire in check	Unsatisfactory	Average Pressure. Extinguished fire (or practically extinguished)	Held fire in check	Unsatisfactory	Average Number Sprinklers Opened. Extinguished fire (or practically extinguished)	Held fire in check
Water works,	55	71	67	7.4	60	31	9	75	59	40	4.9	12.4
Gravity tank,	9	12	21	12.5	33	56	11	19	22	18	4.3	17.4
Pressure tank,	4	5	105	4.2	75	25	0	97	130	0	3.0	8.0
Automatic pump,	9	12	72	6.9	56	22	22	68	62	90	4.2	13.5
Total,	77		64	8.0	57	33	10	72	55	50	4.6	13.3

15. EFFICIENCY OF WATER PRESSURES.

Pressure on Sprinklers.	Number of fires	Per cent. of fires	Average Pressure	Average number Spkrs. opened	Per Cent. of Fires. Extinguished fire (or practically extinguished)	Held fire in check	Unsatisfactory	Average Pressure. Extinguished fire (or practically extinguished)	Held fire in check	Unsatisfactory	Average Number Sprinklers Opened. Extinguished fire (or practically extinguished)	Held fire in check
Less than 15 lbs.,	5	7	13	22.0	0	60	40	0	13	10	.0	22.0
15 to 24 lbs. inclusive,	7	9	20	8.3	57	29	14	20	20	18	4.2	16.5
25 to 49 lbs. inclusive,	11	14	35	6.2	27	55	18	38	31	38	1.7	8.5
50 lbs. and over,	54	70	81	7.2	68	26	6	80	79	95	4.9	13.1
Total,	77		64	8.0	57	33	10	72	55	50	4.6	13.3

16. EFFICIENCY OF WET OR DRY SYSTEM.

Wet or Dry System.	Number of fires	Per cent. of fires	Average Pressure	Average number Spkrs. opened	Per Cent. of Fires. Extinguished fire (or practically extinguished)	Held fire in check	Unsatisfactory	Average Pressure. Extinguished fire (or practically extinguished)	Held fire in check	Unsatisfactory	Average Number Sprinklers Opened. Extinguished fire (or practically extinguished)	Held fire in check
Wet system,	60	78	60	9.4	48	42	10	68	55	46	6.1	13.3
Dry system,	17	22	77	1.9	88	0	12	79	0	61	1.9	.0
Total,	77		64	8 .0	57	33	10	72	55	50	4.6	13.3

Note—"Average number of sprinklers opened" does not in any case include the Unsatisfactory fires.

17. EFFICIENCY OF WATER SUPPLIES. As Regards Amount of Loss.

Primary Water Supply.	Number of fires	Per cent of fires	Average Pressure	Av. No. Spkrs. opened	Per Cent. of Fires.			Average Pressure.			Average Number Sprinklers Opened.		
					No claim	Small loss	Large loss	No claim	Small loss	Large loss	No claim	Small loss	Large loss
Water works,	55	71	67	7.4	38	56	5	78	60	61	4.0	9.9	.0
Gravity tank.	9	12	21	12.4	11	67	22	17	26	16	1.0	15.5	6.0
Pressure tank,	4	5	105	4.2	75	25	0	107	100	0	3.3	7.0	.0
Automatic pump,	9	12	72	6.9	33	55	11	67	69	100	4.0	9.0	.0
Total,	77		64	8.0	36	56	8	78	57	52	3.8	10.6	6 0

18. EFFICIENCY OF WATER PRESSURES. As Regards Amount of Loss.

Pressure on Sprinklers.	Number of fires	Per cent. of fires	Average Pressure	Av. No. Spkrs. opened	Per Cent. of Fires.			Average Pressure.			Average Number Sprinklers Opened.		
					No claim	Small loss	Large loss	No claim	Small loss	Large loss	No claim	Small loss	Large loss
Less than 15 lbs.,	5	7	13	22.0	0	80	20	0	11	14	.0	30.0	6.0
15 to 24 lbs, inclusive,	7	9	20	8.3	29	57	14	21	20	18	2.5	11.2	.0
25 to 49 lbs. inclusive,	11	14	35	6.2	18	64	18	28	35	39	5.0	6.6	.0
50 lbs. and over,	54	70	81	7.2	44	52	3	82	74	103	3.8	10.0	.0
Total,	77		64	8.0	36	56	8	78	57	52	3.8	10.6	6 0

19. EFFICIENCY OF WET OR DRY SYSTEM. As Regards Amount of Loss.

Wet or Dry System.	Number of fires	Per cent. of fires	Average Pressure	Av. No. Spkrs. opened	Per Cent. of Fires.			Average Pressure.			Average Number Sprinklers Opened.		
					No claim	Small loss	Large loss	No claim	Small loss	Large loss	No claim	Small loss	Large loss
Wet system,	60	78	60	9.4	23	68	8	75	56	54	6.1	10.7	6.0
Dry system,	17	22	77	1.9	82	12	6	80	73	42	1.5	7.0	.0
Total,	77		64	8.0	36	56	8	78	57	52	3.8	10.6	6.0

Note—"Average number of sprinklers opened" does not in any case include the Unsatisfactory fires.

Waste and Batting Mills---Fire Record.

Total Number of Fires, 114.

1. CLASSIFICATION OF CAUSES.

Common Causes.

LIGHTING. Number of fires, 1.
Cotton waste falling into open gas flame.
HEATING. Number of fires, None.
POWER. Number of fires, 1.
Ends of broken shaft coming in contact with each other struck spark which ignited oily lint on hanger blocks.
BOILER (or fuel). Number of fires, None.
RUBBISH (or sweepings). Number of fires, 2.
Spontaneous combustion of rubbish under carding machine.
Spontaneous combustion of rubbish.
OILY MATERIAL. Number of fires, 1.
Spontaneous combustion of oily waste.
SMOKING. Number of fires, None.
LIGHTNING. Number of fires, 1.
LOCOMOTIVE SPARKS. Number of fires, 1.
MISCELLANEOUS. Number of fires, 4.
Employee stepped on match, 2 fires.
Truck struck match on floor.
Match in cotton waste which employee was trampling into bin.

Special Hazard Causes.

COTTON BALES. Number of fires, 1.
Combustion in linter bales.
LOOSE COTTON IN BINS. Number of fires, 2.
Matches in loose cotton.
Sparks from machinery ignited cotton in bin.
RAGS OR WASTE (Spontaneous Combustion). Number of fires, 6.
Spontaneous combustion in bale of cotton waste.
Spontaneous ignition of waste.
Spontaneous combustion in stock.
Spontaneous combustion in cotton rags.
Spontaneous combustion in pile of jute waste.
Unknown in bale of waste.
DUSTERS (including Willows). Number of fires, 5.
Foreign substance in cotton waste duster.
Foreign substance in stock passing through duster.

Foreign substance passing through willow, 2 fires.
Friction in willow.

PICKERS (including Lumpers and Lappers). Number of fires, 53.
Foreign substance in stock passing through picker, 27 fires.
Friction in picker, 16 fires.
Caused by picker, 6 fires.
Foreign substance passing through lumper.
Match passing through lumper with stock.
Friction in lumper.
Nail in stock passing through lapper.

GARNETS. Number of fires, 8.
Foreign substance in stock, 6 fires.
Friction in garnet machine, 2 fires.

CARDS. Number of fires, 9.
Friction in carding machine, 4 fires.
Foreign substance passing through carding machine, 3 fires.
Fire started in carding machine.
Hot journal on carding machine.

DRYING. Number of fires, 10.
Stock falling on hot steam pipes in dryer.
Cotton fibre which had collected on steam pipes in dryer ignited.
Cotton fibre on steam pipes ignited.
Ignition of stock in Kitson dryer.
Spark from boiler lodged in cotton thread waste in dry room.
Cotton ignited in dryers, 2 fires.
Overheating of dryer.
Spontaneous combustion of damp waste.
Unknown in dry room.

Summary.

Common Causes.

	No. of Fires.	Per Cent. of Whole.
Lighting	1	.9
Heating	0	.0
Power	1	.9
Boiler (or fuel)	0	.0
Rubbish (or sweepings)	2	1.9
Oily Material	1	.9
Smoking	0	.0
Lightning	1	.9
Locomotive Sparks	1	.9
Miscellaneous	4	3.8
Total	11	

Special Hazards.

	No of Fires.	Per Cent. of Whole.
Cotton Bales	1	.9
Loose Cotton in Bins	2	1.9
Rags or Waste	6	5.7
Dusters (including Willows)	5	4.8
Pickers (including Lumpers and Lappers)	53	50.5
Garnets	8	7.6
Cards	9	8.7
Drying	10	9.5
Total	94	
Common Causes	11	10
Special Hazards	94	90
Total	105	
Incendiary	0	
Exposure	0	
Cause Unknown Fires	9	
Total Waste and Batting Mills Fires	114	

2. DETAILS OF CAUSES.

Special Hazards.

S-2663. The duster in which the fire started consists of an iron cylinder, having wide projecting teeth, revolving in an enclosure having similar teeth. The stock, which is low grade, after passing through the machine is delivered onto an apron which conveys and dumps it in a pile a short distance from the machine. The fire was discovered in this pile and was probably caused by some foreign substance in the stock striking a spark in the machine.

S-6630. Fire was discovered among a lot of cotton card waste on second floor near willow. The mill employees got to work immediately with factory hose and chemical extinguishers and several sprinklers were also in operation. The fire was apparently under control when an explosion occurred in one of the stock boxes, blowing the doors open, scattering fire in all directions, and one of the employees was seriously burned.

The fire was probably caused by an employee stepping on a match in the cotton waste and the explosion was caused by smoke blown through the conveyor pipe to stock box and there igniting by sparks; it being noted during the fire that burning material was drawn into the blower pipe, the fan being still in operation. Twelve sprinklers were opened and held the fire in check where it was impossible to use hose streams owing to the dense smoke.

3. ROOMS IN WHICH FIRE OCCURRED.

	Special Hazards.		Common Causes.		Unknown Incendiary Exposure.		Total Fires.	
	No. of Fires.	Per Cent.	No. of Fires.	Per Cent.	No. of Fires.	Per Cent.	No. of Fires.	Per Cent.
Cotton Storage and Non-Manufacturing	7	8	4	36	4	50	15	14
Boiler Room	..	..	1	9	..	..	1	1
Sorting	1	1	2	18	1	13	4	4
Opening Room	3	3	..	..	..	..	3	2
Dusting	5	5	1	9	..	..	6	5
Picker Room	46	50	..	..	2	25	48	43
Lapper Room	1	1	..	..	..	..	1	1
Lumper Room	3	3	..	..	..	..	3	2
Garnet Room	8	9	..	..	..	..	8	7
Carding Room	8	9	1	9	..	..	9	8
Dyeing House	2	2	..	..	..	..	2	2
Drying Room	8	9	..	..	1	13	9	8
Baling Waste Room	..	..	2	18	..	..	2	2
Total with data given	92		11		8		111	
No data	2		..		1		3	
Total	94		11		9		114	

4. DAY OR NIGHT. (Day Fires 6 a. m. to 6. p. m.)

	Special Hazards.		Common Causes.		Unknown. Incendiary, Exposure		Total Fires.	
	No.	Per Cent.	No.	Per Cent.	No.	Per Cent.	No.	Per Cent.
Day	75	80	8	80	7	78	90	80
Night	19	20	2	20	2	22	23	20
Total with data given	94		10		9		113	
No data	..		1		..		1	
Total	94		11		9		114	

5. PLANT IN OPERATION.

	Special Hazards.		Common Causes.		Unknown. Incendiary, Exposure		Total Fires.	
	No.	Per Cent.	No.	Per Cent.	No.	Per Cent.	No.	Per Cent.
Plant in operation	85	90	9	82	8	89	102	89
Plant not in operation ...	9	10	2	18	1	11	12	11
Total with data given	94		11		9		114	
No data	..		..		..		..	
Total	94		11		9		114	

6. HOW DISCOVERED.

	Special Hazards.		Common Causes.		Unknown. Incendiary, Exposure		Total Fires.	
	No.	Per Cent.	No.	Per Cent.	No.	Per Cent.	No.	Per Cent.
Employee	79	84	8	73	7	78	94	82
Watchman	3	3	1	9	..	..	4	4
Thermostat ...	2	2	..	..	..	..	2	2
Sprinkler Alarm	8	9	1	9	..	..	9	8
Outsider	2	2	1	9	2	22	5	4
Total with data given	94		11		9		114	
No data	..		..		..		..	
Total	94		11		9		114	

SPRINKLER FIRE RECORD.

7. EFFECT OF SPRINKLERS.

	No. of Fires.	Per Cent. of Whole.
Extinguished or practically extinguished fire	75	72
Held fire in check	28	27
Unsatisfactory	1	1
Total	104	
No Claim	58	56
Small Loss	44	42
Large Loss	2	2
Total	104	

8. DETAILS OF UNSATISFACTORY SPRINKLER FIRES.

5618. Troy, N. Y. February 1, 1907. Six-story brick mill constructed building with a complete equipment of Walworth sprinklers. Dry system supplied by water works 45 pounds pressure and a 12,000 gallon gravity tank. Fire got beyond control owing to severe obstruction to distribution and also open chute which allowed fire to spread from one floor to another. For further details see Bulletin No. 17, April, 1907. Fire 5618, page 46.

Summary: Obstruction to distribution.

9. DETAILS OF LARGE LOSS SPRINKLER FIRES. (Where sprinkler control is satisfactory.)

4879. Pawtucket, R. I. June 14, 1906. Fire occurred in bales of linter cotton in yard and spread to unsprinklered frame cotton waste storehouse and from thence to the sprinklered building where it was held in check by the inside sprinklers. The loss was heavy but was quite largely on cotton in yard and unsprinklered storehouse. This was an exposure fire so far as the sprinklered buildings were concerned.

Summary: Exposure fire.

10. POINTS OF INTEREST FROM SPRINKLER FIRE REPORTS.

Fire Department.

2624. Fire was subdued when the fire department came. Firemen however smashed front and rear windows and draught revived the fire. Basement was deluged with water from hose streams.

Fire Doors.

H-662. On fifth and sixth floors part of the fire doors to stairs, and on sixth floor fire door to elevator well were left open and fire communicated through these openings. All such doors should be automatic.

Floor Openings.

2604. The sorted cotton is fed from the third floor to the carding machine on the second floor by means of small chutes which are covered when not in use. One of these chanced to be in operation at time of fire and the fire was quickly communicated to the third floor in this manner.

4364. Fire started on second floor where it was held in check by the sprinklers. Heat however passed up and down through an unused belt opening, opening ten sprinklers on floor above and four on floor below.

5843. Fire spread rapidly over stock and up stairway to attic, door to attic probably being open. In all 88 sprinklers opened.

6156. Fire burned up through belt hole in floor and extended into pockets in ceiling where sprinklers could not reach it. These pockets were caused by broken plastering.

Hose.

5269. An attempt was made to use the one inch hose but when water was turned on the hose burst. This hose takes off from the sprinkler system and had not been used for eleven or twelve years.

Unsprinklered Portions.

2484. Fire broke out in a wood enclosed waste puller or straightener which discharged into a small wooden box from which stock is let out into room at floor. There are no sprinkler heads inside these boxes.

Automatic Sprinklers.

2161. Fire started on platform where there were a number of bales of cotton waste. Fire spread up side of frame building and was kept from entering by the sprinklers inside.

Steam Connection.

2624. This fire furnishes evidence as to the value of steamer connection to sprinklers and the culpability of fire department in not making use of same. Had steamer connection been used indications are that possibly two-thirds of the water damage could have been avoided by confining the water to the location of the fire.

11. NUMBER OF SPRINKLERS OPENED.

No. of Sprinklers Operating.	Extinguished Fire. No. of fires.	Extinguished Fire. Per cent.	Held Fire in Check. No. of fires.	Held Fire in Check. Per cent.	Unsatisfactory. No. of fires.	Total. No. of fires.	Total. Per cent.	No. of Sprinklers Operating.	No. of fires.	Per cent. of whole.
1	29	39	5	18	..	34	33	1	34	33
2	11	15	4	14	..	15	14	2 or less	49	47
3	8	11	5	18	..	13	12	3 or less	62	60
4	5	7	2	7	..	7	7	4 or less	69	66
5	3	4	1	4	..	4	4	5 or less	73	70
6 to 9 inc.	7	9	1	4	..	8	8	Less than 10	81	78
10 to 24 inc.	9	12	4	14	..	13	12	Less than 25	94	89
25 to 49 inc.	3	4	1	4	..	4	4	Less than 50	98	94
50 and over	..	..	5	18	1	6	6	50 and over	6	
Total	75		28		1	104				

Average number of sprinklers opened not including unsatisfactory, 8.2.

12. ALARM SERVICE.

	Satisfactory. No. of Fires.	Satisfactory. Per Cent.	Failure. No. of Fires.	Failure. Per Cent.	Total.
Watchman alone	1	100	..	..	1
Sprinkler alarm alone	10	91	1	9	11
Thermostat alone	..	..	..	..	..

	Watchman.		Sprinkler Alarm.		Thermostat.		Total.
	Satisfactory.	Failure.	Satisfactory.	Failure.	Satisfactory.	Failure.	
Watchman and Sprinkler Alarm	..	1*	1	..	..	..	1
Watchman and Thermostats	..	..	..	..	..	..	..
Sprinkler Alarm and Thermostats	..	..	1	..	1	..	1
Watchman, Sprinkler Alarm and Thermostats	..	..	..	..	..	..	..

*These include fires where sprinkler alarm or thermostats notified the watchman.

Note.—These tables do not include fires where alarm service does or does not operate properly if fire is at once discovered by employee, the alarm service having no bearing on such fires one way or the other.

13. SECONDARY WATER SUPPLY.

4364. Primary supply pressure tank. Second supply 1,000 gallon rotary pump and 750 gallon steam pump. In all 43 sprinklers opened and pumps were started promptly maintaining a heavy pressure of approximately 80 pounds. The pumps were undoubtedly of value in maintaining a heavy pressure as otherwise the pressure tank would have been exhausted.

5618. Primary supply water works, 45 pounds. Second supply 12,000 gallon gravity tank. Owing to obstruction to distribution from stock fire was not controlled by the sprinklers.

5843. Primary supply water works 65 pounds. Second supply steam pump. Eighty-eight sprinklers opened and pump was of service in holding up the pressure.

6377. Primary supply water works 60 pounds. Second supply 1,000 gallon steam pump and a rotary pump which were started promptly and helped to maintain a good pressure on the sprinklers, 49 of which opened.

14. EFFICIENCY OF WATER SUPPLIES.

Primary Water Supply.	Number of fires	Per cent. of fires	Average Pressure	Average number Spkrs. opened	Per Cent. of Fires. Extinguished fire (or practically extinguished)	Held fire in check	Unsatisfactory	Average Pressure. Extinguished fire (or practically extinguished)	Held fire in check	Unsatisfactory	Average Number Sprinklers Opened. Extinguished fire (or practically extinguished)	Held fire in check
Water works,	42	40	53	10.2	57	41	2	61	43	45	5.9	16.2
Gravity tank,	29	28	19	3.2	83	17	0	19	19	0	2.9	4.8
Pressure tank,	31	30	92	11.1	81	19	0	90	100	0	6.4	30.8
Automatic pump,	2	2	65	3.0	100	0	0	65	0	0	3.0	.0
Total,	104		56	8.2	72	27	1	58	51	45	5.0	17.3

15. EFFICIENCY OF WATER PRESSURES.

Pressure on Sprinklers.	Number of fires	Per cent. of fires	Average Pressure	Average number Spkrs. opened	Per Cent. of Fires. Extinguished fire (or practically extinguished)	Held fire in check	Unsatisfactory	Average Pressure. Extinguished fire (or practically extinguished)	Held fire in check	Unsatisfactory	Average Number Sprinklers Opened. Extinguished fire (or practically extinguished)	Held fire in check
Less than 15 lbs.,	5	5	9	2.4	80	20	0	9	9	0	1.3	7.0
15 to 24 lbs. inclusive,	22	21	19	2.7	68	32	0	18	19	0	2.6	3.3
25 to 49 lbs. inclusive,	21	20	33	4.5	62	33	5	34	31	45	4.5	4.3
50 lbs. and over,	56	54	83	12.4	77	23	0	83	81	0	6.4	32.7
Total,	104		56	8.2	72	27	1	58	51	45	5.0	17.3

16. EFFICIENCY OF WET OR DRY SYSTEM.

Wet or Dry System.	Number of fires	Per cent. of fires	Average Pressure	Average number Spkrs. opened	Per Cent. of Fires. Extinguished fire (or practically extinguished)	Held fire in check	Unsatisfactory	Average Pressure. Extinguished fire (or practically extinguished)	Held fire in check	Unsatisfactory	Average Number Sprinklers Opened Extinguished fire (or practically extinguished)	Held fire in check
Wet system,	88	85	52	7.8	70	30	0	53	50	0	4.4	16.1
Dry system,	16	15	75	11.4	81	13	6	79	63	45	8.1	33.0
Total,	104		56	8 .2	72	27	1	58	51	45	5.0	17.3

Note—"Average number of sprinklers opened" does not in any case include the Unsatisfactory fires.

17. EFFICIENCY OF WATER SUPPLIES. As Regards Amount of Loss.

Primary Water Supply.	Number of fires	Per cent. of fires	Average Pressure	Av. No. Spkrs. opened	Per Cent. of Fires.			Average Pressure.			Average Number Sprinklers Opened.		
					No claim	Small loss	Large loss	No claim	Small loss	Large loss	No claim	Small loss	Large loss
Water works,	42	40	53	10.2	43	52	5	57	50	65	2.7	14.1	57.0
Gravity tank.	29	28	19	3.2	55	45	0	17	22	0	3.1	3.4	.0
Pressure tank,	31	30	92	11.1	74	26	0	90	98	0	5.6	27.0	.0
Automatic pump,	2	2	65	3.0	50	50	0	80	50	0	1.0	5.0	.0
Total,	104		56	8.2	56	42	2	59	50	65	3.9	13.1	57.0

18. EFFICIENCY OF WATER PRESSURES. As Regards Amount of Loss.

Pressure on Sprinklers.	Number of fires	Per cent. of fires	Average Pressure	Av. No. Spkrs. opened	Per Cent. of Fires.			Average Pressure.			Average Number Sprinklers Opened.		
					No claim	Small loss	Large loss	No claim	Small loss	Large loss	No claim	Small loss	Large loss
Less than 15 lbs.,	5	5	9	2.4	100	0	0	9	0	0	2.4	.0	.0
15 to 24 lbs, inclusive,	22	21	19	2.7	50	50	0	18	19	0	3.2	2.5	.0
25 to 49 lbs. inclusive,	21	20	33	4.5	43	52	5	32	33	45	3.0	5.6	.0
50 lbs. and over,	56	54	83	12.4	59	39	2	88	75	85	4.7	22.1	57.0
Total,	104		56	8.2	56	42	2	59	50	65	3.9	13.1	57 0

19. EFFICIENCY OF WET OR DRY SYSTEM. As Regards Amount of Loss.

Wet or Dry System.	Number of fires	Per cent. of fires	Average Pressure	Av. No. Spkrs. opened	Per Cent. of Fires.			Average Pressure.			Average Number Sprinklers Opened.		
					No claim	Small loss	Large loss	No claim	Small loss	Large loss	No claim	Small loss	Large loss
Wet system,	88	85	52	7.8	53	45	1	54	49	85	3.0	12.3	57.0
Dry system,	16	15	75	11.4	69	25	6	81	64	45	7.9	21.0	.0
Total,	104		56	8.2	56	42	2	59	50	65	3.9	13.1	57.0

Note—"Average number of sprinklers opened" does not in any case include the Unsatisfactory fires.

General Fire Record.

FIRE-PROOF BUILDINGS FIRE RECORD.

The Committee on Fire-Proof Construction has received numerous requests for information concerning the reliability and safety of concrete chimneys, chiefly of the dwelling house type and made of blocks rather than the moulded monolithic type which is already well established for power plant service.

The Committee would appreciate advices from any readers concerning their experience with chimneys of this type.

E. T. CAIRNS, *Chairman.*

H-2968. Anderson, Ind. December 9, 1907. Old People's Home. The accompanying illustrations show the result of a fairly severe fire in a building of concrete block construction. This building had been recently

Fire-Proof Building Fire No. H-2968.

completed for use as an old people's home, but had not yet been occupied. The fire apparently consumed everything combustible in the building, but the damage to the walls was not sufficient to necessitate their removal, and it is understood that they have been used for rebuilding, with only a minor amount of repairs at the top.

Fire-Proof Building Fire No. H-2968.

The blocks were of single piece type made with Portland cement, sand and gravel.

H-2967. Chicago, Ill. January 27, 1908. Bank. The possibility of damage to even a fire-proof building by exposure from adjoining structures is instanced by fire of January 27, 1908, in this building. This bank building, which was a fine new 18-story structure, under construction at the time of the fire, had not progressed far enough to contain any great quantity of combustible material in the shape of wood flooring, trim, etc., and, of course, was entirely unoccupied.

A serious fire developed in a hotel adjoining the bank building, and the flames from this hotel ignited numerous window frames in many of the upper stories of the bank building and also damaged the wall to some extent.

The loss was adjusted at a little under 3% of the sound value of the building, but there is no doubt that if the structure had been completed and had contained the usual quantity of combustible contents, the fire would have been entirely beyond the control of the department in the upper floors and a very serious loss, not only to the contents, but to the building itself, would have resulted. The protection of such windows as were damaged in this case by wired glass is entirely practicable and the necessity for such protection is illustrated by this case.

H-2965. Chicago, Ill. January 28, 1908. Mercantile. On January 28, 1908, this building suffered severe damage due primarily to unprotected window openings. The building was basement, seven stories and low attic; ground area of about 10,000 square feet, of substantial steel

Fire-Proof Building Fire No. H-2965.

frame with old style Phenix end construction, tile floors and roof. It contained the usual wood trim, and one-inch wood flooring, and was otherwise finished as an ordinary mercantile building, occupied throughout by a wholesale millinery house with work rooms on several floors.

The fire originated in a large wall paper store, 40 feet distant from the Keith Building across a rear alley, and after practically enveloping that building the fire was blown by high wind clear across the 40-foot alley, and against the large unprotected upper windows of the Keith Building, the result being that the contents of the three upper floors caught fire at about the same time and before the fire department could control the situation these three and one floor below were completely burned out. The contents of these rooms were highly inflammable, and, it is stated, were entirely consumed, so that there was absolutely nothing more in the room to burn in thirty minutes.

The effect on the building of this rapid combustion of contents was that the tile covering of columns and beams was badly cracked and spalled and stripped from its position in a large measure. Also the floor arches were similarly damaged. Most of the tile remained in place long enough, however, to prevent serious injury to the steel frame, except in the attic where there was a considerable damage to metal work.

The loss to the building was finally adjusted at 28.3% of its sound value.

Had the rear windows of this building been properly protected by good fire shutters or wired glass, there is little or no doubt that the building and its contents would both have been saved, with practically no loss.

Fire-Proof Building Fire No. H-2965.

The accompanying illustrations show the completeness of the destruction of contents and, to some extent, the damage to building.

H-2966. Boston, Mass. February 17, 1908. Club House. On February 17, 1908, fire occurred in this building which illustrates the importance of protected communications between the various floors, even in a building of nominally fire-proof construction.

The building was of a good type of steel and tile construction, of small area, seven stories high and occupied as a club house.

Fire originated in a closet on the third floor used for the storage of supplies, and as this closet was located near a dumb-waiter shaft, the openings in which had been left open, the fire soon spread out into the room up through this shaft, damaging the finish and decorations of the third, fourth, fifth and sixth floors, and making a loss of 10% of the value to the building and 13% to the contents.

It is quite true that a fire having such headway on four different floors would probably have resulted more disastrously if the building had been of ordinary construction. However, the loss would have been practically negligible if the floor openings had been properly protected, as they should be in any building which claims fire-proof classification.

H-2969. Murfreesboro, Tenn. April 29, 1908. Storage and Rink. Another serious fire in a building of concrete block construction occurred at Murfreesboro, Tenn., on April 29, 1908, in a basement and two-story building, 60x115, occupied in basement and first story for storage of hay, grain, feed, cotton and hardware; second story as roller-skating rink. Walls were 10-inch single piece hollow blocks, floors and roof of ordinary joist construction. Fire started in first story and burned from 9.30 p. m.

Fire-Proof Building Fire No. H-2969.

Fire-Proof Building Fire No. H-2969.

till midnight. The blocks appear to have been a rather poor quality of heavy single piece type, made with crushed stone aggregate and quite porous. All walls above the first floor fell, the rear and front walls being completely down, with the exception of several lower courses of blocks of rear wall. Rear wall fell first, carrying fire into a frame "ell" of livery stable, No. 223 West Main Street. This was followed by the west wall, which carried fire into the frame, ironclad blacksmith shop, No. 221 West Main Street, completely consuming it. It should be noted that the only weight carried by the walls was the dead weight of the second floor and roof, at the time of fire the second floor (skating rink) being unoccupied.

Beyond considerable chipping and small amount of spalling, the limestone foundation which formed the basement wall is not badly injured, and with repairs, may be used again.

The total damage to the building and contents is estimated at $10,000.

Unequal expansion between the outer and inner shells of blocks is clearly demonstrated by the rear wall where the bond between the outer and inner shells of blocks is cracked continuously almost the entire length of the remaining wall.

This was undoubtedly a long hot fire and furnished a more severe test of the blocks than the other fire mentioned above, and seems to justify the opinion of the Committee on Concrete and Reinforced Concrete expressed in last year's report that "well made blocks are suitable for small buildings, where no high pressure temperatures or long continued fires are to be expected, but that the hollow form in which they are made, absolutely precludes their being classed as highly fire-resistive or suitable for fire walls, or for any buildings which may be subjected to severe fire."

UNSATISFACTORY OR SERIOUS FIRES IN RISKS EQUIPPED WITH SPRINKLERS.

6740. Parkersburg, W. Va. December 19, 1907. Woodworker. Large two and three-story frame planing mill and woodworker with three-story brick addition. Ordinary joist construction with open stairways, elevator and chutes. Risk located near centre of town with fire department near by. Ample supply of hydrants but small street mains. Risk equipped with Neracher sprinklers, dry system, supplied by city water and 18,000 gallon gravity tank.

Fire was discovered on first floor at 9.50 p. m. by the watchman of the neighboring plant. The department responded promptly and extinguished the fire with the help of sprinklers which operated. Fire seems to have been mostly on the outside of the building. Water was shut off the sprinklers and an additional watchman employed for the rest of the night. At 3.15 next morning a second fire was discovered by the same outside watchman, but this time it was on the third floor. Fire spread rapidly and got beyond the control of the fire department. Cause of both fires unknown. It appears that the sprinkler system was entirely out of service at the time of the second fire, although watchman claims that the sprinkler valve was open when the firemen arrived. This fire shows the necessity of watching the part of a building for several hours which has been on fire, instead

of making the regular rounds and cleaning up plant. If the sprinkler heads which opened at the first fire had been replaced immediately and the system placed in working order there is no doubt but that second fire would have been extinguished with small loss.

Summary: Water shut off after first fire.

7095. South Carolina. March 6, 1908. Cotton Warehouse. Construction. The Cotton Warehouse No. 15 is one of five compartments, each separated from the others by a blank brick wall parapetted through roof and ends. The end walls of the building are wood, light construction, with doors at front but none at back end. There is a loose plank floor having about 1′ space under it. The roof is boards on joists covered with tin. Compartment No. 15 is 150′ long by 22′ wide, and from 20 to 25′ high.

Protection. The storehouse has Grinnell glass disc sprinklers properly spaced, and the system is supplied by public water and pumps, with outside control. The heads, however, are too near the roof, some in fact being almost between the joists, interfering with proper distribution. The primary supply to sprinklers is from public water of fair pressure, but lacking in volume. The two pumps at this risk were in good order, promptly started, and furnished ample water for this fire. It was stated that as soon as the alarm was received, the pumps at the pumping station were speeded up and run fast until the fire was out. (The superintendent states that the pumps at the pumping station are run 24 hours each day at ordinary speed, but when fire alarms are received, they are speeded up and the gate to standpipe closed, thus affording direct pumping during a fire.)

Contents. Compartment No. 15 where the fire occurred contained 1,021 bales of uncompressed cotton, all put in in October, 1907. The building was full and the bales were piled **nine high on side.**

Course of Fire. A woman living back of Storehouse saw smoke coming out of building and gave the alarm to Mill at 10 a. m., also telephoning public alarm from neighboring store. The superintendent, remembering that water was shut off of sprinklers, at once opened the indicator post valve in front of No. 15 Section and let the water on. The mill hands at once laid two streams from yard hydrants and later on another one, and when the public department arrived, they used two streams from the street hydrants. The pumps being started very promptly, there was good pressure from very nearly the beginning. These streams were used at the front door, but no fire being seen on account of smoke, it was concluded that the fire was somewhere in the centre of the building and holes were cut through the roof near that point, through which the hose streams were used. It is believed that no sprinkler heads opened until about five minutes after the holes were cut in the roof, as no water could be heard running, nor did anything appear to be wet on top of the pile. The superintendent is very positive on this point and it may be accounted for by the depth of the pile of bales, which being compactly stowed, confined the heat from the fire burning near the floor (as subsequent examination showed); also there were openings under the roof at each end, no doubt allowing much of the first of the heat to

escape. Sprinklers opened in time to prevent the flame reaching the top of the pile and the roof is not scorched. The floor is somewhat burned. After about 45 minutes the fire seemed to be controlled, the wooden end at back of Storehouse was torn down, and the work of removing the cotton from both sides began. The plan pursued was to clear an alleyway in towards the fire, by removing the bales from but one side of the compartment, thus decreasing the time of reaching the centre of the building by half. No burned bales were found until these alleyways had been driven in 50 or 60′ from each end and then the fire was found directly under where the holes were cut through the roof.

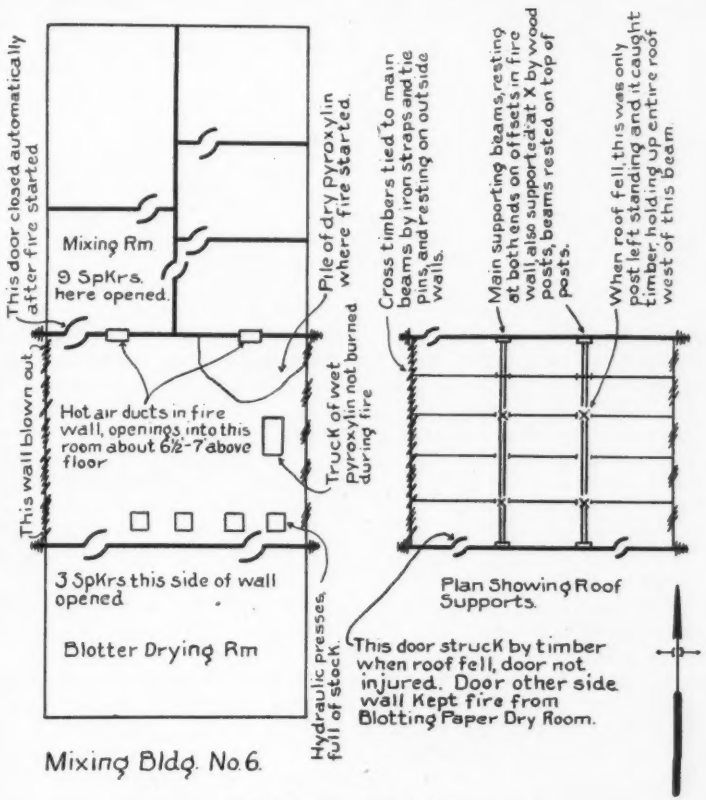
The burned bales, about 275 in number, were removed to the yard and the fire extinguished.

Summary: Obstruction to distribution.

6988. Kalamazoo, Mich. March 8, 1908. Paper Mill. Two-story brick mill constructed building. Fire started in basement containing stock of cut paper, baled rags, etc. Cause unknown. Started in loose cut paper storage. Risk was equipped with Manufacturers sprinklers, wet system, supplied by water works, 90 pounds pressure and pumps. Sprinklers failed to control the fire because of some obstruction or foreign material in the feed pipe to this section of the building. Sprinklers in adjoining section operated and prevented fire from spreading beyond the section in which it originated.

Summary: Feed pipe clogged with foreign material.

6987. Springfield, Mass. March 8, 1908. Manufacturing Fibreloid. (A pyroxylin compound similar to celluloid.) A severe explosion occurred in the press room, first floor of mixing building No. 8, Sunday morning, March 8, at about 9.25. One of assured's foremen and a gang of men were at work in the second floor of the Acid building No. 6, which is a new building on east side, and hearing noise of explosion ran to windows and saw roof of the press room being lifted and at same time a very large and brilliant shaft of flame that appeared to them to shoot up from about middle of roof and is described as appearing and disappearing with much the same brilliancy and rapidity as a streak of lightning. After this first burst of flames they seemed to die down for a short while, then broke out again but not at all in same manner. Foreman, who is one of the firemen, rushed to the nearest hose house and said that within a minute they had four streams on the fire. Watchman was just in front of office building at the time and he ran to the scene pulling in private fire alarm; the public department was not called. Men responded very quickly, there were probably 15 or 20 around risk at the time and before long seven streams were in use. Assured's fire pump was started very soon afterward and run for about 50 minutes. Foreman, who was in Acid building, saw when he arrived that sprinkler system was ruined so very soon shut off P. I. V. controlling this building and depended entirely on hose streams; he states that from two to four streams were kept playing on the sections of the building north and south of press room and fire did not extend to these parts. Superintendent states that watchman heard rotary gong ringing before he heard explosion


This door closed automatically after fire started
Mixing Rm
9 SpKrs. here opened.
Pile of dry pyroxylin where fire started.
Cross timbers tied to main beams by iron straps and tie pins, and resting on outside walls.
Main supporting beams, resting at both ends on offsets in fire wall, also supported at X by wood posts, beams rested on top of posts.
When roof fell, this was only post left standing and it caught timber holding up entire roof west of this beam
This wall blown out
Hot air ducts in fire wall, openings into this room about 6½-7 above floor
Truck of wet pyroxylin not burned during fire
3 SpKrs this side of wall opened
Blotter Drying Rm
Hydraulic presses, full of stock
Plan Showing Roof Supports.
This door struck by timber when roof fell, door not injured. Door other side wall kept fire from Blotting Paper Dry Room.
Mixing Bldg. No. 6.

Sprinkler Fire No. 6987.

and that sprinklers had operated before explosion. Foreman stated that he and his men did not hear rotary gong until after explosion and this seems the more probable story, as, if it had rung, they being in the next building would have heard it first.

Assured's fire department certainly did good work in handling the fire, the building was burned very little and there was a large amount of stock in building at the time, 4,000 pounds of dry stock and a truck of wet pyroxylin (latter did not burn during fire).

Description of Press Room. Press room is located in centre section of the basement and one-story mixing building, size 63x50′; walls all brick with thin glass windows in east and west walls; 12″ fire walls, 3′ parapet, cut off this section from those on north and south; openings in fire walls protected by double automatic sliding fire doors

with good heavy hardware. Roof was heavy plank on timber, open finish, there being two main supporting beams running north and south, spaced 20′ apart, that rested on offsets in brick fire walls and the cross timbers running east and west were spaced 10′ apart resting on top of outside walls and tied onto the main beams with iron straps. There were four wooden supporting posts, 9x9″, two for each of the main beams. Floor was plank and top board on timber.

Room was heated by hot air, there being two heating ducts passing up through the north fire wall (between press room and mixing rooms) with the openings provided with metal dampers, 6½ to 7′ above the floor. No lights or electric wires in room, electric lights being provided with reflectors and located outside of windows.

Effect of Explosion. Entire roof was lifted and when it fell back only one post remained in place, that one was at northeast end near where fire started; this post caught one of the cross timbers and kept the roof for a distance of 20′ all along east end from collapsing, but the remainder crashed down onto the west wall of room practically demolishing it. It is interesting to note here that one of the roof timbers was found forced down onto the iron track of fire door, this forced door open about 2″ but did not break either door or hardware and the door on other side of fire wall kept fire out of blotter drying room. Only a few feet of the parapets of fire walls were demolished and these were at ends where outer wall fell. East wall was practically uninjured, fire walls uninjured, floor and basement not injured by explosion.

Cause of Fire. In the northeast corner of press room, piled on floor up against fire wall, just in front of hot air duct was a loose pile of pyroxylin, several hundred pounds. Stock had been through the acid and subsequent washing process and had been mixed with camphor and was waiting here ready for the hydraulic process. In this state it is light and flaky and burns very fiercely. About 20′ from here there was a truck of wet pyroxylin which was not burned at all during fire. There was about 4,000 pounds of pyroxylin in vicinity. The superintendent gives following as what he calls "only explanation he can offer": There is considerable fine dust in this room and when floor was laid a very small crack was left between end of boards and brick wall. He says they noticed that this was a place where dust would collect, so had a wood moulding laid over crack. He says that according to his theory fire was caused by decomposition of this celluloid dust in this small crack and that heat from duct on floor below caused it to ignite spontaneously and fire was communicated to pile of loose pyroxylin. What happened next can be seen.

This does not seem reasonable to inspector, considering the very small amount of dust that collected here against the 12″ brick wall and also the statement of engineer and also superintendent that heat was not turned into ducts at time of explosion. Engineer says it takes very little to heat this room and that he seldom has to open ducts, also that he has a man whose duty it is to make a trip at night and see that certain ducts are closed so as not to waste heat and he is sure this one was shut. It seems to inspector that fire was from one of

two causes: First, that possibly duct was not closed tight and that some heat was passing through, in which case it would be blown directly onto the pile of pyroxylin and might cause an explosion (hot air runs about 140-150°); or second, that the trouble was with the pile of pyroxylin itself. Perhaps it had not been as carefully washed as usual and acid not all removed or perhaps not enough water was left in the pyroxylin and when in this state, if too dry, it is inflammable. Inspector understands that workmen think it was due to presence of acid. Assured have always considered this one of their most hazardous sections and this is also shown by their intention now to build a new detached pyroxylin house northwest of machine shop and move present pyroxylin drying down there, then every night any pyroxylin that has not been put into the presses will be left in the house now used for pyroxylin drying; all heat will be removed from latter building. Possibly part of the pile of pyroxylin had been in room for several days, drying gradually all this time and as pile was near window, the morning sun may have had something to do with it, as it was a warm bright day. Watchman visited room about an hour before explosion and did not detect anything wrong at that time.

Damage By Fire. Damage by fire was slight considering the large amount of exceedingly inflammable material in room. All of the timbers and beams have been put back in place, no new ones required and although a new plank roof has been put on, the old planks were not burned badly enough to be ruined and could have been used again except for appearances. Floor is very little burned and there are no holes in same. All of which shows what efficient work private department did.

Damage By Water. There was a heavy water damage to powdered zinc in barrels stored in the basement of press room, there was no fire damage here.

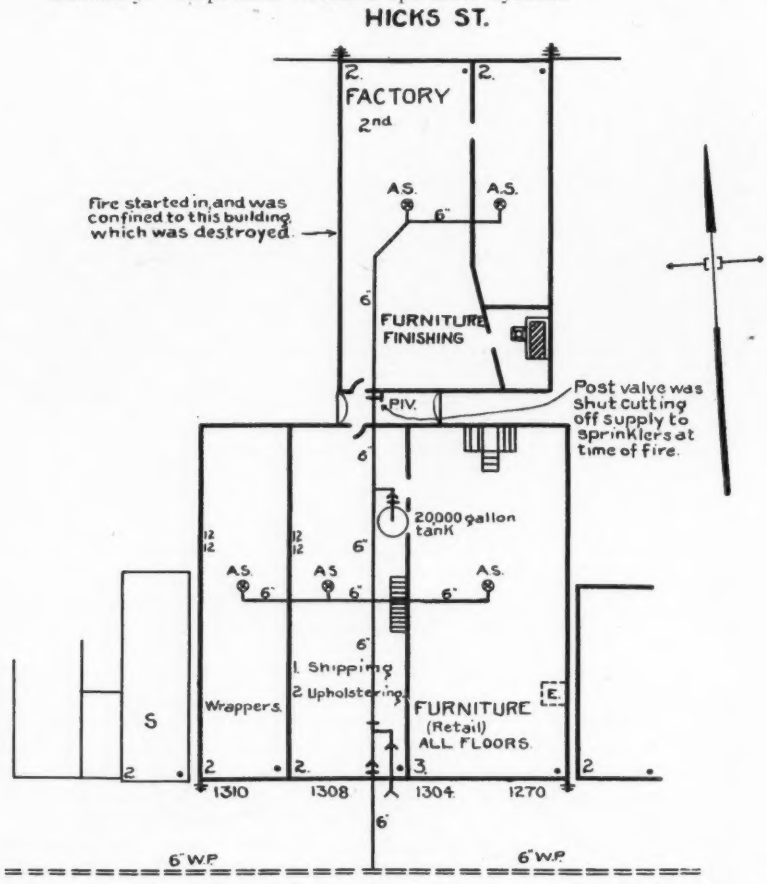
Fire Doors and Walls. Fire doors did good service and stood fire well, are all in good condition now. Of course, these were kept wet down most of the time with the hose streams but must have withstood a considerable heat at the beginning of fire. Evidently the door from press room to mixing room north of press room was left open and closed automatically soon after fire started. Nine sprinklers in this room operated, there is some sign of smoke on the ceiling and sprinklers must have operated promptly because some trucks of mixed pyroxylin in this room were not burned. Fire walls proved very efficient and, on account of proper construction, blowing off of roof did not injure walls.

Fire again illustrates the great hazard connected with this class of risk. Assured seem to be thoroughly afraid of fire themselves and evidently wish to take all possible precautions, but even with excellent care the hazard is everywhere present and is bound to make itself known in one portion or another of risk.

The scheme of removing unpressed pyroxylin to the small detached house is a good one and appears to be as safe an arrangement as could be made. When assured have fires they always take some

measure to prevent a recurrence of same conditions, so that risk is improving rather than increasing in hazard.

Summary: Explosion wrecked sprinkler system.



Sprinkler Fire No. 6999.

6999. Toledo, Ohio. March 9, 1908. Furniture Factory. Plant consists of two moderate sized ordinary constructed brick buildings, a retail furniture store and a furniture factory, separated by an alley twelve feet wide. Factory building which was burned was two stories in height, joisted floors and roof, with two open stairways. First floor woodworking, dry kilns and boiler house. Second floor varnishing. Plant was equipped with Manufacturers sprinklers, 1906, wet

Sprinkler Fire No. 6999.

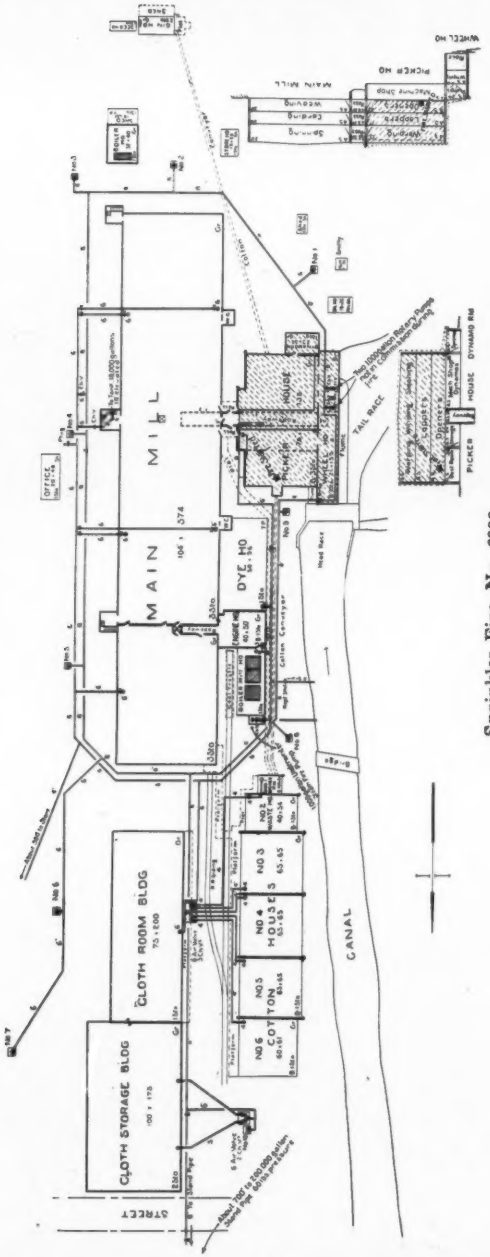
system, supplied by water works 60 pounds pressure and 20,000 gallon gravity tank also city steamer connection.

Fire was discovered by watchman fifteen minutes after completing his 3 o'clock round. He pulled fire alarm on second floor of retail building and although fire department responded promptly the building was well on fire before they arrived. Building was practically a total loss. It was found that the post gate valve controlling the sprinklers in this building was shut at the time of fire so that the sprinkler system was out of service. Fire doors at passway between building, while not standard, did good work and the department was able to keep the fire from spreading to the front building.

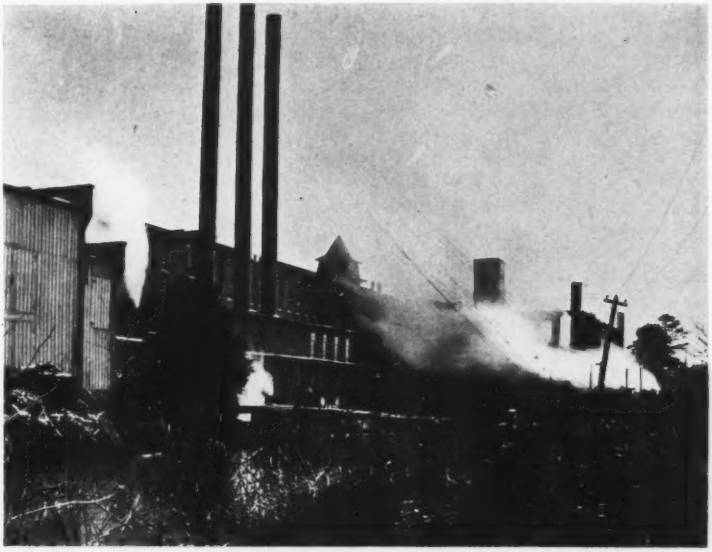
Summary: Water shut off.

6993. Cooleemee, N. C. March 13, 1908. Cotton Mill. Picker house at this risk practically destroyed. This was a basement and three-story brick mill constructed building. There is a brick enclosed rope way connecting the wheel house adjoining the picker house to the main mill, extending to the top floor of the mill, all openings into this rope way being protected with standard fire doors, except from the wheel house. On each side of the rope way there is a frame passageway connecting mill with the picker house, door openings at each end being protected with standard fire doors. Building protected with Grinnell glass disc sprinklers installed in 1900. Wet system, supplied by a 200,000 gallon standpipe giving 60 pounds pressure at ground level, also a tank of 18,000 gallons capacity, also 1,000 gallon Underwriter steam pump, also two 1,000 gallon rotary pumps.

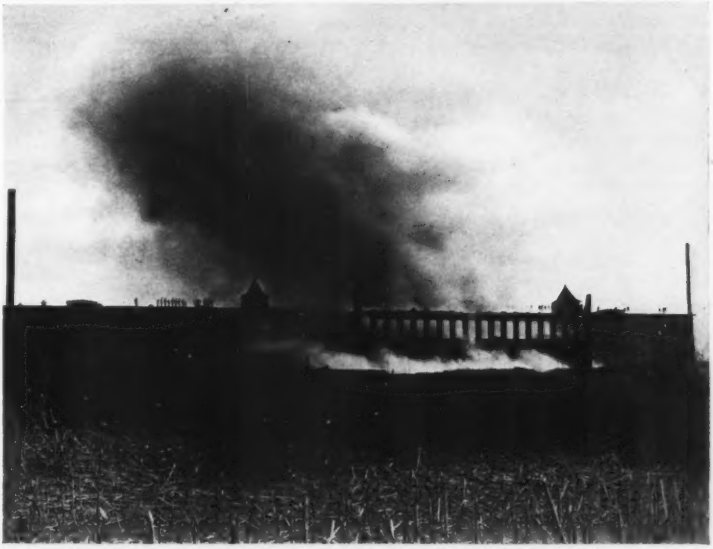
About 8 o'clock in the morning an employee in opener room noticed burning cotton dropping from condenser head. He endeavored



Sprinkler Fire No. 6993.



Sprinkler Fire No. 6993.



Sprinkler Fire No. 6993.

to extinguish it with a chemical extinguisher but was unsuccessful. The alarm was promptly given and steam pump started. Three hose streams being in service within a few minutes, this number being later increased to eight. The picker building was destroyed but fire was prevented from entering main mill. It appears that sprinklers did not discharge water to any extent at least until fire had been in progress some little time and the only explanation there seems to be is, that valve controlling sprinklers in picker house was shut at time of fire and opened later on.

Summary: Water shut off.

6994. Herring, N. Y. March 13, 1908. Paper Mill. Fire occurred in frame metal clad storehouse, joisted construction, one-story, used for storage of old paper. Fire was discovered by employee at 12.30 p. m. and superintendent states that it flashed quickly through the piles of old paper, smoke being so dense that they could not tell whether sprinklers operated or not. Building was equipped with Walworth and Manufacturers sprinklers, supplied by gravity tank and steam pump. Pump was started promptly and supplied sprinklers and hydrants. Roof fell and broke sprinkler piping, after which post gate was closed. Normally a dry system but water on at time of fire. Inside gate valve found open after fire. There is no satisfactory reason for the failure of the sprinklers. The care of fire appliances had not been good in the past but apparently the system was in service at time of fire.

Summary: Not classified.

7005. Cincinnati, Ohio. March 23, 1908. Shoddy Mill. One-story frame building of ordinary joist construction occupied for drying. Fire occurred at 10 p. m. Watchman failed to discover it as he was in another part of the building. Sprinkler system in this building was shut off at time of fire because of cold weather so that system was not in service.

Summary: Water shut off.

7115. Chelsea, Mass. April 12, 1908. Manufacturing Circular Loom Tubing. Brick and frame factory in the path of the Chelsea conflagration. This factory burned somewhat in advance of the main line of the conflagration. A curry shop just west of this risk was the first fire to catch in this vicinity. Its roof was ignited from flying brands and it burned rapidly, setting fire to the lightly combustible three-story tenement block just across from this risk. The curry shop caught at about 12.45, the main line of the fire being about two blocks away. At about 12.30 the front cornice and tank enclosure of the sprinklered risk caught fire. The Sunday watchman and one other man were at the risk and when the fire advanced toward the risk they rang in both the public box and the A. D. T. alarm boxes inside in the hope that some aid could be summoned. There was no response, the public alarm wires were probably down at this time but four alarms were received at the A. D. T. headquarters in Boston, although they could not be forwarded to Chelsea.

The two men at the risk used small hose and emptied most of the 12 chemicals in their efforts to prevent fire getting hold of the risk,

Sprinkler Fire No. 7115.

but such means were inadequate. No hose streams were available. The men also opened sprinklers by breaking them where near the windows. Fire quickly worked into the roof and opened a large number of sprinklers. The tank was probably quickly emptied and the city water pressure at this time was probably not over 10 pounds, as there are only 6" mains at the risk and there were heavy demands on the system.

At 1.15 other employees and the superintendent arrived at the risk but nothing could be done and the men were compelled to leave at about 1.30. The main plant was nearly destroyed by 2 o'clock, the machine shop burning a little later.

Summary: Conflagration.

7116. Chelsea, Mass. April 12, 1908. Metal Worker. This risk was one of the buildings burned during the first part of the Chelsea conflagration and really might be considered to have been destroyed be-

Sprinkler Fire No. 7116.

fore the fire reached conflagration proportions, this fact together with its location and the flank of the centre path of the conflagration rendered it possible for the fire department to endeavor to save it. The exposure was considerable but not excessively heavy, consisting on the windward side of two-story frame dwellings, one about 10′ distant and several small frame barns and sheds, some of which were used as junk shops located about 50′ distant.

The fire first caught from sparks carried by the high wind in rear frame detached unsprinklered portions of the plant used as foundry, paint and iron storage buildings and rapidly consumed them without, as far as could be learned, any effort being made by the department to save them. At this stage of the fire the entire available fighting force was at work on buildings which had previously caught and which were located a considerable distance to the windward of this risk.

Upon the arrival of aid from Boston, three streams from two steamers were brought into service upon the main building of this risk, the roof of which at this time was on fire, it having caught from the unprotected cornice and worked its way over into the building. At this time assured's frame buildings had burned flat. The district chief of the Boston department, who was in charge at this part of the conflagration, states that there was no lack of water but that owing to the lack of roof scaling ladders and owing to the heavy wind (although the steamers were working under heavy pressure), the streams could not be efficiently directed into the heart of the fire.

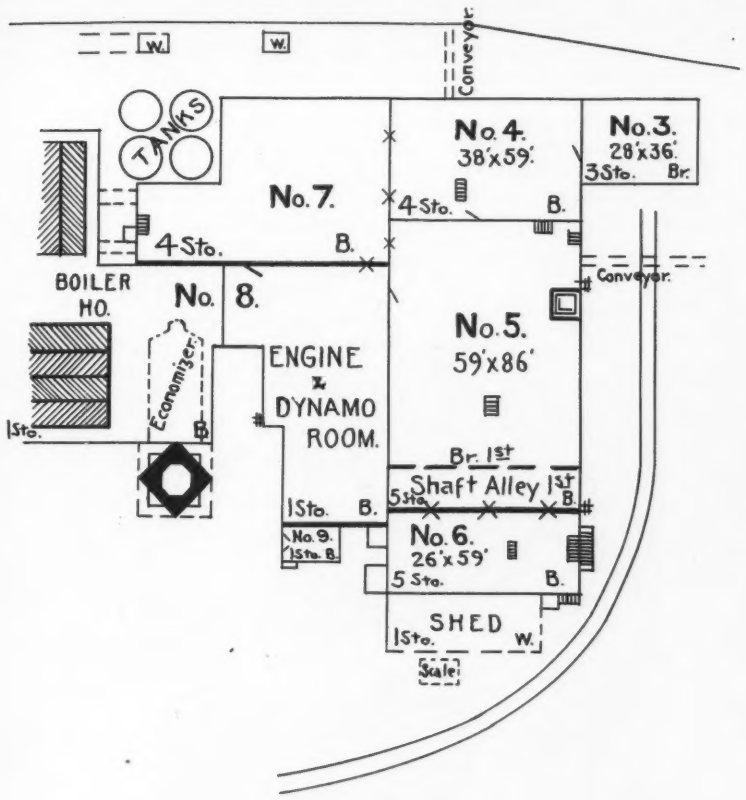
The sprinklers properly operated but did no effective work, except in the boiler house, the roof of which did not fall. The fire gained its foothold upon the exterior of the building and acquired magnitude beyond sprinkler control, probably before any sprinkler in the building opened. When the steamers were brought into service the sprinkler pressure was materially reduced and their effectiveness impaired.

Points of Interest.

1. Risk should have had protected cornice or better brick parapetted wall with wire glass windows, shutters or open sprinklers.
2. Permanent ladders leading to roof would have been very valuable. (Owing to the magnitude of the conflagration the fire department ladders were in use elsewhere.)
3. Steamer connection to the automatic sprinklers would have been of value.

Summary: Conflagration.

7117. South Chester, Pa. April 28, 1908. Dye Wood Extract Works. Group of brick buildings occupied for manufacturing dye wood extracts. Fire was caused by dust explosion in the wood bins upper floor of No. 5, also communicating to Chipper Building No. 6 and spreading almost immediately over the upper floors of Nos. 4, 5, 6, and 7. Men in first floor of Chipper Building, No. 6, were seriously burned. Explosion tore off a large portion of roof of building No. 5, collapsing the sprinkler system. The wood room in the top of No. 4 and 5 runs the whole length without cut-offs. The chips from the Chipper Building in No. 6 were carried up by means of bucket eleva-



Sprinkler Fire No. 7117.

tors from the chippers and then, after dropping down to the second and third floors of this building, passing through the screens and gyraters, they were again elevated to the fifth floor and carried by means of two screw conveyors to the wood storeroom, these conveyors passing through the fire walls in which there were also several openings protected by swinging fire doors, not self-closing. This fire wall served to stop the passage of the fire from the second and third floors of the Chipper Building, which are totally destroyed, to the machine floors of No. 5, thus saving considerable loss.

Risk was equipped with automatic sprinklers, wet system, supplied by water works 70 pounds, and a good steam pump. The pump was started promptly but on account of broken pipes the pressure was weak. City department brought three engines taking water from the river. The four upper floors of No. 6 and two upper floors of Nos. 4, 5 and 7, and a part of roof of engine and dynamo house were burned.

The fire department aided by the sprinklers saving the remainder of the plant. The work of the sprinklers was particularly noticeable in preventing the fire from spreading to lower floors of No. 5 through openings around tanks. The post gate valves controlling sprinklers were not shut until the fire was under control.

Summary: Dust explosion wrecked sprinkler system.

7118. Roby, Ind. May 8, 1908. Starch Factory. I beg to submit report of starch explosion and fire which occurred at noon, May 8, 1908, in the dry starch building, causing a loss of from $50,000 to

Sprinkler Fire No. 7118.

$60,000. Risk was visited on May 10, 1908. The following description of construction and occupancy is made from my own observation after the fire on May 10, 1908, and from such information as was at hand.

"Dry starch building" was a fairly substantial brick structure, except that west wall of grinding room was of hollow tile carried on brick pilasters spaced 12'. Two and three equals four stories in

height, with cupola on part of third story; open semi-mill construction with unprotected stair openings; floors also penetrated by chutes and conveyor pipes. Roofs, composition on plank. Grinding building was cut off by a 12 to 16" blank brick wall, except one 10x10" square hole on first floor through which passed the wood rough starch chute, and four openings near roof (27' above roof of grinding room) for the passage of two 18" and two 22" galvanized iron pneumatic conveyors for pulverized stock. Building was comparatively new.

Processes as follows: The rough dried "pearl" starch was conveyed from kiln house 80' distant by a screw conveyor through bridge to third story, where it was stored in a small bin and fed by gravity through above described wood conveyor to mills. Starch mills consist of eight aluminum-bronze beaters revolving at the rate of 2,700 revolutions per minute in two radial planes of four blades each ½" from a cast iron shell. Each set of four blades is one solid casting, both sets revolving on the same shaft.

Directly above the grinding chamber is a large double cast iron cone shaped chamber and exhaust fan, this acting as a pneumatic separator by drawing the fine starch dust through a 10" opening out of the mills and allowing any of the coarser stock to fall back into the mill. Extending in a straight line from the mill to the roof is an 18" relief pipe containing a check-valve opening outward designed to provide a vent for explosion, the exhaust fan drawing horizontally out of this relief pipe.

From the mill the pulverized starch is forced by atmospheric pressure through a cyclone separator in third story, the heavy stock going to reel and the mixture of light dust and air returning to mills, any surplus air over what is required by the pneumatic separator at mills feeding into a stocking dust collector venting over roof. The only fresh air entering the process is that which leaks in and, as the mills are almost air tight and the separating machinery absolutely so, the mixture is very dense and **ordinarily** the percentage of air is below that required to make the explosive mixture **until the reel is reached.** The above process was in duplicate, there being two mills, pneumatic separators and cyclones feeding to one reel and one stocking dust collector. The reel is of the ordinary type used in flour mills, revolving at 35 revolutions per minute, bolting the pulverized starch through a fine wire mesh, the finished stock dropping through a wood chute to storage bin directly beneath. In place of the reel, the assured occasionally experimented with a vibrating seive, but this was not in use at time of explosion. Stocking dust collector is of the ordinary type used in flour mills, feeding the heavier stock through a wood chute to the finished product bin, venting the lighter dust mixed with air over the roof. The third story, containing reel, vibrating separator and stocking dust collector, was ordinarily very dusty, much dust escaping from the reel; and, as there was necessarily considerable circulation of air through the reel, it is my opinion that the explosive mixture of starch dust and air was present more frequently in the reels than elsewhere in the process. Both starch grinding mills were fed with rough stock by one screw conveyor passing through wall. Pulverized stock

from each mill is passed to top of three-story building through a 22" pipe, surplus air and starch returning through an 18" pipe, all of light galvanized iron. Explosion occurred during the lunch hour, but plant was running as usual although only one man was actually tending the machinery, he being in charge of the grinding room.

Effects of the explosion are best shown by accompanying photograph. The division wall collapsed down to about 12' below the roof. The tile west wall and roof of the grinding building collapsed completely and the three outside walls of the two-story and basement warehouse collapsed down to the second floor, bringing the roof down upon the piles of barrels. The only fire resulting was in the third story where it destroyed the roof, part of the floor and practically all of the inflammable contents, including wood parts of reel and separator and starch. The sprinkler piping was broken down (apparently by the initial explosion) and the snapping of a 4" cross main as well as the 2½" pipe supplying the third floor put the sprinkler out of service at the outset. There is no evidence of any water having been discharged from sprinklers and the system is regarded as a negligible factor in this report. Fire was extinguished promptly by employee with private hose streams before fire department arrived, and the spread of the fire was prevented by their good work, doubtless aided by the flow of water from the broken 4" cross main on second floor of warehouse which flooded that section for a few minutes before the post valve was shut in order to save the water for the hose streams.

The actual origin of the spark of flame which caused the explosion is in doubt, but, in my opinion, the explosion occurred in the high third story, probably in the reel which is a total wreck but, being largely consumed by fire, the necessary evidence for a positive assertion is lacking. That the explosion proper did not occur in the grinding mills is evident from the fact that these machines are intact internally, except for evidence of some moderate internal pressure in the South Mill, where the inner cone is slightly compressed, probably by the back draft from the explosion in the third story. This explanation of the damage to the cone is carried out by the fact that the return duct (18" pipe) to this mill is flattened for a considerable distance as though by atmospheric pressure, there being no sign of abrasion at this point. My theory being that this back flash forced up the inner cone and created a vacuum causing the collapse of the pipe. I find no evidence of explosion in the grinding building and am of the opinion that the tile west wall was carried down by the force of the impact of the third story wall striking the roof and parapet simultaneously. It is also possible that the fire originated from a frictional spark in one of the grinding mills or fans and that the starch was carried sizzling (as starch burns with a supply of oxygen inadequate for complete combustion) through the cyclone and found the explosive mixture of air and starch at some point in the third story (probably at the reel). If this is what occurred, it indicates defective action of the cyclone. But, as stated above, it is inconceivable that the explosion proper took place in the grinding building.

This was hardly what could be termed a violent explosion, and

the destruction of the walls was probably due in part to the sudden expansion of the air (the heat developed by a flash fire of starch being very intense). There was apparently little detonation as the neighboring buildings were not affected, except where an ordinary glass window was blown out of tower on kiln building opposite end of enclosed bridge.

This disaster brings out no new points as regards the explosive characteristics of starch, the results being about what are to be expected. It emphasizes, however, the fact that the sifting (reels, etc.), process may be more hazardous than the actual grinding and that both should be isolated from main values of plant, also, the unreliability of sprinkler protection in risks of this class. A bronze casing, as well as beaters, would reduce the likelihood of friction at the mills.

In conclusion, the fact remains that the explosive mixture of starch and air is present at frequent intervals and losses of this kind will be repeated in the future, at least until there is a radical change in processes, and the need of the elimination of every possible source of ignition needs no comment.

Summary: Starch explosion wrecked sprinkler system.

Convers Goddard, *Inspector.*

The North British and Mercantile Insurance Company.

7567. Duluth, Minn. June 6, 1908. Grain Elevator. Fire occurred in track floor of elevator shortly after noon, the sprinkler supervisory alarm being given at 12.38. An employee pulled the public fire box very soon after. The cause of fire is probably hot box at belt drive. Risk was equipped with Neracher and John Kane sprinklers installed in 1892 and 1902, and old system partly remodelled. Mostly 9x9 feet spacing on open-joisted ceiling. Many sprinklers too close to joists. Dry system, about 250 sprinklers in one area. The water supplies consisted of two pressure tanks and fire pumps. It appears that an explosion of fine dust shortly after fire occurred made fire spread too rapidly to be controlled by the sprinklers.

The elevator was built on piling on Rice's Point, with bay on south and slip on north, elevator C 498 feet east and elevator G 250 feet west. Built in 1884 and in good repair. Crib construction, metal clad 150 feet high. Ground floor area about 30,000 square feet, cupola area about 15,000 square feet. Double floor on joist in first, single in upper floors; open joist ceilings. Unprotected floor openings were belt holes, four open stairs in machine and scale floors; elevator legs open at tops, large part of garner, circle and bin floors open. Power house was of brick fire-proof construction and adjoined elevator on east; blank wall between elevator and engine room. Power drive was located inside of elevator in track floor, and connected with machinery through floor openings unprotected. Premises ordinarily clean, but during morning run fine dust had accumulated and resulted in heavy explosion. Area under first floor had no sprinklers, likewise no sprinklers in scales, or under floors over bins; many sprinklers up between joists.

It is thought the fire originated from hot box at power drive which was driven at 70 revolutions per minute or at idler near power drive; idler was driven at 175 to 200 revolutions per minute. Oil man completed

round at 11.45 and reported bearing O. K. All machinery stopped at 12 noon. Supervisory system reported water flow at 12.38. Public fire box No. 58 located 25 feet east of power house was pulled at 12.39. The weighmaster claims to have been on scale floor, and smelling smoke ran down to the bin floor where he saw flames leap up through belt holes from track floor. The foreman claims to have been in the track floor, but neither of these men pulled an A. D. T. box, of which there is one on each floor.

Apparently fire was discovered by a man outside and near elevator "C." Two fire companies responded immediately and in eight minutes two more came. The fire tug America, which was four miles away, arrived at 2 p. m.

The writer was inspecting a gravity tank a mile and a quarter distant when he noticed the fire: this was 12.55 p. m. So far had the flames now advanced that the top of the elevator was pouring forth a solid mass of flames.

Firemen soon realized that the destruction of elevator "D" was inevitable and applied every effort to save elevators "C" and "G," and it was only after hard work and extreme risk of their lives they were successful. The first flames leaping through the roof of the elevator ignited the Northern Pacific Warehouse 150 feet north. This was a one-story light wood frame building and was soon razed to the water's edge. The loss on this warehouse will be about $25,000. The fire was fanned by a brisk breeze from the southeast which did not change its course during the afternoon. Constant streams of water were poured upon elevators "C" and "G" and on coal docks about 160 feet south. The destruction of the elevator was complete, leaving nothing but a smouldering mass of grain and wreckage.

The capacity of the elevator was 1,400,000 bushels. It contained 3,500,000 bushels of wheat, 95,000 bushels of flax, and 7,000 bushels of barley at time of fire. Owing to location of this elevator, the firemen could fight the fire from the west end only.

Summary: Dust explosion.

LARGE LOSS SPRINKLER FIRES.

Where Sprinkler Control is Satisfactory.

5930. Dayton, Ohio. October 29, 1907. Sheet Metal Worker. Four-story brick building of ordinary joist construction. Fire occurred on fourth floor used as a wareroom for gas stove, etc. Risk equipped with Grinnell glass disc sprinklers, dry system, old style spacing and arrangement, not staggered, supplied by water works 45 pounds pressure. Fire was of incendiary origin. Sixty-five sprinklers opened and were of service in holding the fire in check, although of somewhat doubtful value owing to light pressure. The water works pressure was during the fire increased to 100 pounds. Loss about $10,000.

Summary: Weak water supply.

6010. Philadelphia, Pa. November 8, 1907. Rug Mill. Fire

occurred on fourth floor of mill constructed building occupied for storage of finished rugs. Eight sprinklers opened and held fire in check. There appears to have been considerable delay in shutting off the water due to lack of knowledge as to location of gate valve so that heavy water damage resulted. Loss about $23,000.

Summary: Delay in shutting off sprinklers.

6936. Philadelphia, Pa. January 3, 1908. Woolen Mill. Fire occurred on second floor of mill constructed building occupied for storage of finished and unfinished woolen dress goods. Started in storage bin filled with finished goods, from some unknown cause. Eight sprinklers opened and practically extinguished the fire. Heavy water damage due to valuable stock. Sprinkler alarm operated properly. Loss about $14,000.

Summary: Not classified.

6952. New York, N. Y. February 24, 1908. Mercantile Risk. (Wholesale Clothing House.) Fire occurred on sixth floor of fireproof building occupied as a wholesale house with some cutting, starting under stock table filled with worsted clothing. One sprinkler opened and practically extinguished the fire. Alarm was given promptly and water shut off promptly. Loss about $9,000.

Summary: Not classified.

6980. Minneapolis, Minn. February 29, 1908. Mercantile Risk. Five-story building occupied as a furniture store. Fire started on fifth floor filled with furniture wrapped in excelsior and paper. Fire occurred at 10 o'clock in the morning and the alarm was promptly given to the central station by the sprinkler alarm. Fifteen sprinklers opened and practically extinguished the fire. City fire department however responded and by the promiscuous use of water caused a very heavy damage. Loss $57,000.

Summary: Susceptible stock.

7553. New York, N. Y. June 9, 1908. Department Store Cold-Storage Room. A fire of unknown origin broke out shortly after 11 o'clock on the night of June 9 in the fur cold-storage room on the fifth floor of the above premises, and although confined to a small area, caused the operation of 18 sprinklers and a loss of probably 62 2-3% to the contents. It seems almost incredible that a fire to which only three pieces of Fire Department apparatus were called, and which was extinguished in about thirty minutes after its discovery, could have resulted in such heavy loss. This may be understood in part when one considers that the fire smouldered for two or three hours before discovery, that the sprinklers were slow to operate owing to the fact that the blower or fan which circulates the cold air through the room was in operation and was not shut down until the fire was practically extinguished, and that within an area of about 4,000 square feet there were stored furs to the value of $760,000. Detailed report follows.

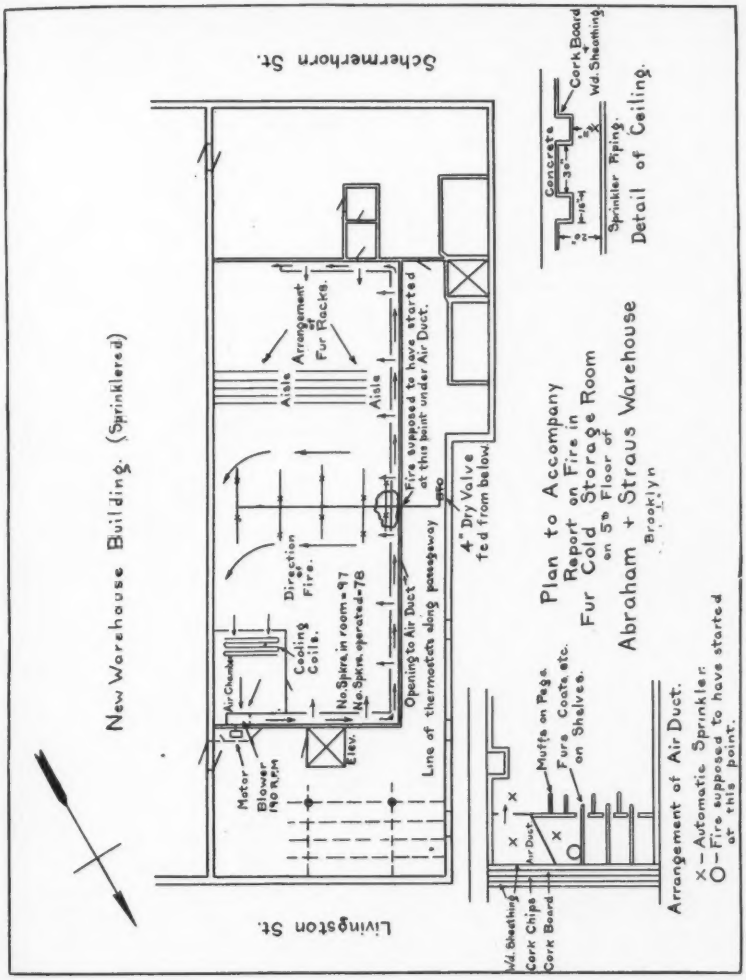
General Description of Building. Construction: fireproof, 6 stories, basement and sub-basement; walls, brick; floors and roof, concrete; girders and I-beams of steel, poorly protected with cement plaster on wire mesh; columns, cast iron having similar protection, except in basement, where they are unprotected. Area: 8,500 square

feet. Stairs and elevators cut off. Communications: protected by good fire doors to new fireproof warehouse at east and to tunnel to main store across Livingston street.

Occupancy. General stock of china, house furnishings and groceries from 2d to 4th floors, the 1st floor being a large driveway extending from street to street, with receiving room; basement and subbasement contain steam plant, including fire pumps. The 5th floor, on which fire occurred, is used for cold-storage of furs, and the 6th for the storage of rugs and linoleum. Condition somewhat unsettled owing to transferring of stock to new fireproof warehouse adjoining at east.

Protection. Automatic sprinklers throughout, 1896 standard. Grinnell glass disc heads, basement to 4th, installed 1898; Manufacturers' No. 4 heads, 5th and 6th, installed 1901. Wet pipe system except in 1st story and in cold-storage room on 5th, where system is dry pipe, the former being controlled by a Grinnell dry pipe valve, the latter by a Manufacturers' dry pipe valve. Supplies: a 1,000-gallon automatic steam pump maintaining 80 to 85 pounds pressure on sprinkler system and draughting from a reservoir of 43,000 gallons capacity; and three gravity tanks having a total capacity of 18,500 gallons located over roof of west building and elevated about 40 feet above highest line of sprinklers. In addition to the above supplies there is a 1,000-gallon non-automatic steam fire pump and a steamer connection for use of the Fire Department. Harkness Tee alarm valve, having local alarms and a connection with the central station of the Consolidated Fire Alarm Company. Two watchmen nights, with American District Telegraph central station service. Two interior standpipes with hose each floor, also supply of fire pails. Special building signal each floor, and Western Electric thermostats connected to central station throughout building, except in fur cold-storage room on 5th floor, where fire occurred.

Description of Cold-Storage Room. The fur cold-storage room is located on the 5th floor, was built in 1891 and has an area of approximately 4,000 square feet, being 40 feet in width by 100 feet in length, this being approximately 45% of the entire floor area. Entrance is effected through one doorway at the Schermerhorn street end, which is protected by an iron safe door with combination lock. This door opens into a vestibule, which in turn leads into an intermediate room, and this latter leads into the cold-storage room proper, the doors between the vestibule and the intermediate room, and between the latter and the cold-storage room being of wood, refrigerator type. The construction of room is as follows: north, west and south walls built up of two thicknesses of ⅞-inch matched pine boards with tarred paper between, nailed to 2x3 wood studding, spaced about 18 inches. Spaces between studding filled with cork chips; inner side of three 1-inch thicknesses of cork board, with tarred paper between and one thickness of ⅞-inch matched boards, making a dead wall. The east wall is of ⅞-inch matched boards, cork board with tarred paper between laid against and secured to the brick wall of the building. Ceiling is of concrete, narrow bays spaced 4 feet on centres, covered


Schermerhorn St.
New Warehouse Building. (Sprinklered)
Livingston St.
Plan to Accompany Report on Fire in Fur Cold Storage Room on 5th Floor of Abraham + Straus Warehouse Brooklyn
Arrangement of Air Duct.
X – Automatic Sprinkler.
O – Fire supposed to have started at this point.
Detail of Ceiling.
Concrete
Cork Board
Wd. Sheathing
Sprinkler Piping.
Arrangement of Fur Racks.
Aisle
Aisle
Fire supposed to have started at this point under Air Duct.
4" Dry Valve fed from below
Direction of Fire.
Cooling Coils.
Air Chamber
No. Spkrs. in room = 97
No. Spkrs. operated = 78
Opening to Air Duct
Line of thermostats along passageway
Elev.
Motor Blower 190 R.P.M.
Muffs on Pegs. Fur Coats etc. on Shelves.
Air Duct
Wd. Sheathing
Cork Chips
Cork Board

Sprinkler Fire No. 7553.

with two thicknesses of cork board with tarred paper and finished off with ½-inch wood sheathing. Height of ceiling, 12 feet. Floor of concrete, with cement finish. Columns cast iron, protected with cement plaster on wire mesh; many of these are wrapped with paper. Cold-storage or refrigerating system consists of a Sturtevant blower inside of air chamber and located in cold-storage room. This blower is belted to an electric motor located outside of cold-storage

room, the shaft of blower extending through wall. The blower is operated continually at about 190 revolutions per minute and draws the air from the storage room through two openings, each 22x22, located in side wall of air chamber at ceiling about the cooling coils, and forces it through a wooden duct running along the ceiling at the north, west and south sides of room. This duct is about 3x3 feet in size, with bottom sloping toward wall of room, and about 4 feet above floor at lowest point, and vents to room at ten or twelve different points at ceiling through openings about 20x20 in size. The only entrance to this duct from the outside is effected through a small door opening in west wall, the door being always kept closed and fastened. The cold air chamber containing the cooling pipes and blower is a small room about 15x20 feet, partitioned off at northeast corner of cold-storage room, and is accessible from said room only. This cooling process is simply the circulating of air about the room, notably along the ceiling, the air from the room being drawn in and passed about the cooling pipes and forced out into the room through the duct hereinbefore mentioned. The process is therefore continual in order to keep a nearly even temperature of 18 to 20 degrees Fahr.—20 degrees at time of fire. Lighting is electric incandescent, both fixed and portable lamps, the latter having guards. Wiring in iron conduits secured to ceiling, the current supply being controlled from outside of room and cut off at night or about 6 o'clock P. M.

Contents. Furs (coats, jackets, wraps, muffs, etc.), also some heavy clothing, largely hung from ordinary coat hangers suspended from iron pipe racks spaced about every 3 feet and admitting of a 2-foot clear space below ceiling. There are two aisles down the room, the racks being at right angles to aisles. Muffs in wood racks set on floor and on wood pegs secured to wood strips extending from floor to ceiling and alongside of air duct. Wraps and capes stored in rolls on wood shelves under air duct. All garments are said to be thoroughly brushed and cleaned before being taken into storage room, particular attention being paid to searching pockets for matches. Claimed no naphtha or benzine used in cleaning and no camphor, etc., placed in garments or room. The room is in charge of a competent man during the day, and at 6 o'clock or thereabouts is locked up, electric lights cut off and burglar alarm set at doors. Moreover, the night watchman who patrols the 4th, 5th and 6th floors is said to make his headquarters near entrance to room. Nothing out of the ordinary had taken place in this room or on this floor on the day of the fire. No repair work had been done in the room, and it is stated that the electric lights were cut off, and everything was apparently all right when the safe door was closed and the burglar alarm set, shortly after 6 P. M. It is stated that these furs were to be transferred to cold-storage room in new warehouse inside of 48 hours.

Sprinkler System. Room equipped with Manufacturers' No. 4 sprinklers, upright, on dry pipe system, controlled by a 4-inch Manufacturers' dry pipe valve. 97 heads in room, including those in and under duct. Dry pipe valve is located just outside of room in passageway at west and about 6 feet distant from first line of heads which it

controls. Air pressure on day of fire at valve registered 57 pounds; water pressure about 65 pounds (no water pressure gauge at valve). Alarm connection with this dry valve was through a diaphragm attachment set to ring an electric gong in engine room when the air pressure dropped to 22 pounds. Previous tests of this dry valve showed that it would operate at 19 pounds air pressure with 60 pounds water pressure. Pipe sizes and general arrangement in accordance with the rules of 1896—side central feed, 6 and 7 heads on branch lines. Spacing good, approximately 8x9 feet, staggered, but not in accordance with present rules in that the heads were located under the centres of alternate beams with deflectors 10 to 12 inches below beams and 19 to 20 inches below ceiling proper. Seemingly this spacing would not have played so important a part in the operation of the sprinkler had the ceiling not been combustible. As it was, the water from sprinklers could not wet other than the face of the beams under which the heads were located, and the contents of the room. Water supply excellent, being automatic steam fire pump and gravity tanks previously described. Alarm system good. Inspection report on day of fire showed all valves open and secured, and system in good condition.

Story of Fire. The night watchman who patrols the 4th, 5th and 6th floors was returning from the 6th floor shortly after 11 o'clock. A. D. T. record shows he visited station on the 6th floor at 11:06. While passing through passageway between westerly wall of building and fur cold-storage room on the 5th floor he smelled smoke. Immediately he telephoned the night Superintendent at the main store across the street and then went back into passageway, where he discovered smoke blowing out on the ceiling about midway of the passage and along the wall of the cold-storage room. He quickly procured two pails of water and tried to extinguish the flames, which were then appearing through the cracks at the top of the wall. By this time the night Superintendent arrived and ordered the watchman to take down a line of hose from the standpipe nearby. While this was being done a fireman appeared and assisted in directing a stream of water from this standpipe on the flames, which were shooting out along the ceiling. Suddenly there came a heavy puff of smoke and some flames, and the side of the cold-storage room for about 15 feet bulged out from the top and vented about 4 feet above the floor. This was no doubt caused by the expansion of heated air and gases in the tightly closed room. By this time the Fire Department apparatus arrived, having been summoned at 11:07 P. M. by an automatic alarm (thermostats). On account of the smoke the firemen had considerable difficulty in making their way around to entrance to the cold-storage room, and when they did they were unable to get into the room, as its entrance, as aforesaid, is protected by a heavy safe door with combination lock, and there was some delay in opening the door. But one line of hose was taken into building by the firemen. This was provided with a shut-off nozzle and was dragged up the stairway at the Schermerhorn street end of building. This line and the one previously mentioned from standpipe were used at short intervals on the smouldering woodwork at point where fire burst out of room and when the wall was being chopped

away by the firemen. Some little delay was experienced by the firemen first in effecting an entrance to the building, as the watchman at the first floor would not let them in, he not knowing there was a fire in the building, and again in getting into cold-storage room on account of the combination lock. It is not apparent that these delays contributed in any degree toward the loss, for the sprinkler system operated about the time the members of the Fire Department reached the 5th floor, water-flowing alarm (sprinklers) being received at central station at 11:12 P. M. The sprinklers were kept in operation until the Fire Department had located the fire, and then the water supply was shut off by order of the Fire Patrol only when it was thought that the fire was extinguished, but was ordered turned on again by Chief Lally of the Fire Department shortly after as the fire broke out again. This action was repeated three or four times, so it is said, i. e., the water supply to the sprinklers was turned on each time the fire rekindled and turned off when it appeared to be extinguished. Except for the two hose streams hereinbefore mentioned, which were in service only for a few moments at a time, the fire was fought by means of the sprinklers and extinguished by them. The Fire Department did not connect to the sprinkler system.

Operation of Sprinkler System and Result. Credit must be given to the sprinklers for the extinguishment of this fire. Considering the serious condition existing during the fire, the location of sprinkler heads with respect to the wood sheathed ceiling and the fact that the fire must have smouldered for possibly two or three hours, permitting of a very slow rise of temperature, it seems almost remarkable that the sprinklers should have practically extinguished the fire and with but little outside aid. Out of a total of 97 sprinklers in the room, 78 were opened by the fire, all but five being under the ceiling. The opening of so large a number of heads caused the fire pump to run at top speed and drew heavily on the gravity tank supply located over roof of west building across Livingston street. Upon investigation after the fire these tanks were found nearly empty. It is roughly estimated that these heads must have discharged nearly 1,000 gallons of water per minute, if not more, and if they were in operation for twenty minutes, which from all accounts would appear to have been the case, there must have been nearly 20,000 gallons of water discharged onto this fire by the sprinklers. The cause of so large a number of sprinklers operating, the difference of time between the operation of the thermostats in passageway outside of room and the sprinklers (records at central station show automatic alarm received at 11:06; sprinkler alarm, 11:12), and subsequent water damage may be attributed to the following: The blower hereinbefore mentioned, which circulated cold air through the room was in operation throughout the fire, or was not shut down until practically extinguished. It can readily be seen that with such a condition as having air which is slowly heating circulated about a room, drawn through cooling coils and then forced out in room again in the form of cold air, it must have taken a considerable time for the air in any one place to have become heated sufficient to fuse a sprinkler, and when it did the fire itself was being drawn

across the room over the tops of the heavy garments and along the combustible ceiling. Observation of the contents and of the ceiling shows conclusively that the heated air and fire were drawn across the room in a direct path toward the air chamber. The wood sheathed ceiling aided in the spread of the fire, and the continual operation of the blower forced it through the bays and at the same time carried the heat away from the sprinklers, retarding their operation. The delay or slowness in action of the sprinkler system was not due to the apparatus, but to the condition hereinbefore mentioned. Five heads which did not fuse, but which were apparently in the path of the fire, were afterwards removed, tested, and operated satisfactorily. The dry pipe valve was examined externally on the morning after the fire and internally later on, and was found in good condition. There was apparently no lack of water. The statement of the night engineer in charge of fire pump is to the effect that pump started up suddenly shortly after 11 o'clock and that it was run at top speed through the automatic regulator on stem line. He is positive that the pump was not slowed down by him, and that it continued to run at high speed until it slowed down of its own accord or when water was shut off the sprinklers. Estimated time that pump was in operation, 20 to 25 minutes. Estimated pressure at pump, 70 to 80 pounds.

Cause of Fire. Not ascertainable. A careful investigation of the electric light circuits within the room shows no evidence of their having caused the fire. A number of portable electric lights or extensions are in use almost constantly, but it is said that these are provided with proper guards. There is, however, a chance that one of these unguarded or with a loosened guard was laid among some furs, collars or muffs on the shelf immediately under air duct, and being in contact with the silk linings for a considerable time, set fire to same, and that fire smouldered in among these furs until it finally reached the woodwork of the wall and worked its way up into wall and into duct where it was fanned into a blaze. Another theory advanced is that a spark from the blower was blown through air duct and lodged in an accumulation of dust and thus started a smouldering fire. This, however, does not seem probable, as point where fire appears to have started is about 80 feet distant from blower via duct, and there is no evidence of fire inside of the duct 20 feet from where the fire broke out. Further, the blower was started up and run for several minutes the day after fire and was found in good condition, there being no evidence of a hot bearing or loose blade. Spontaneous ignition in the linings of some of the furs stored on the shelves or in the cork filling of wall does not seem probable. Every indication points to the fire having started under the air duct about in the centre of some furs piled closely against the west wall, and it is here that it seems probable that a portable electric light or extension was left burning for some time. There is a possibility, too, that the current was not turned off that night when the room was locked up at 6 o'clock and the extension light theory is therefore probable. There is, too, a possibility that matches were left in the pockets of some of the coats, or that some of the linings had been cleaned with naphtha or some volatile fluid which

had not thoroughly dried out. Such being the case, it is easy to understand how ignition could have taken place from an electric incandescent lamp.

Insurance on contents	$1,015,000
Value of furs in cold-storage room, estimated	760,000
Loss confined to contents of cold-storage room and roughly estimated at	500,000
Insurance on building	240,000
Loss, estimated	3,000

The west wall of room for about 15 feet is badly damaged. The upper part, together with air duct at this point, having been badly burned, was pulled down by firemen. The furs, mostly coats, that hung in the centre of room and in a line extending from west wall of building or point where fire is supposed to have started to east wall and for a width of more than 30 feet, were badly burned, some totally destroyed, others only having collars singed off. Almost all the garments on the upper of the two tiers of rods throughout entire room show signs of scorching. The ceiling in this path is badly burned at west and charred in many bays nearly to east wall. All of the furs were pretty thoroughly soaked with water and saturated with smoke. The contents are now being removed and hung up on wood racks to dry out in the new warehouse. In this connection it seems desirable to call attention to the necessity for having goods of this kind marked with individual metal tags securely attached. Some water worked through the ceiling of 4th story and a trifle through ceiling of 3d story, but most of the water was swept down the Schermerhorn street stairway, and the quick work of the Fire Patrol in spreading 130 covers prevented serious water damage. Sawdust was spread out on floor to absorb the water dripping from ceiling and garments.

Recommendations as a Result of Fire. Air duct or ducts to be equipped with automatic dampers, arranged to be controlled by fusible links properly installed. The blower or fan to be equipped with an automatic "stop" or "controller," arranged to be operated either by electric thermostats having low fusing points or thermometers having proper attachments installed within cold-storage room. These devices to be adjusted or set to operate the "stop" or "controller" on blower or fan so that when the temperature rises to 100 degrees F. the blower or fan will shut down. Rooms for cold-storage purposes should be of good fireproof construction, with walls and ceilings covered with some good insulating material having good absorptive qualities. Cork board properly coated with cement is recommended for this purpose. Rooms of large area and great height (20 feet) should be sub-divided by the proper introduction of concrete partition walls not less than 3 inches thick. This sub-division is for the purpose of dividing the values, and the number of partition walls required could be determined by the maximum value that could be stored within a given area. Approved thermostats (automatic fire alarm) to be installed throughout all portions, including in and under all ducts, shelves, cupboards,

etc. System to be complete and in accordance with standard in every respect, except that circuit-closers or thermostats should be designed to operate at low temperature of, say, 120 degrees or less, if reliable, and such circuit-closers or thermostats should have distinctive markings to avoid the possibility of their installation in other than cold-storage rooms. In addition to this thermostat system having regulation central station connection, it should be connected to proper gong or gongs and annunciator, if necessary, at two points in risk, so that alarms will be transmitted thereto in event of the operation of a thermostat. Proper places for the location of alarms to be determined upon inspection. Automatic sprinklers, approved type, dry pipe system, to be installed throughout cold-storage portions, including in and under all ducts. The question of whether heads employing solder fusing at less than 155 to 165 degrees can be successfully manufactured for use in cold-storage rooms is now being taken up with the several sprinkler manufacturing companies and will be reported upon later.

E. P. Boone, *Supt. of the Automatic Sprinkler Department, New York Fire Insurance Exchange.*

OTHER SPRINKLER FIRES OF ESPECIAL INTEREST.

7033. Georgetown, Wash. February 19, 1908. Brewery. Fire occurred in the wash-house (also used as pitch room). Wash-room is a one, equal to two-story brick building, 90x280′, 26′ high. Roof, tar and gravel over 2″ planks on 3x14″ rafters, 20″ centers, 12″ posts, 25′ centers. Floor, 2¾″ plank on cinders. Accessory woodwork such as supports for shafting, braces, elevated walk and stairway. One wood slatted ventilator 30x130′, and one 15x70′, raised 5′ above roof. One 7½x 19′ skylight, plain glass, in wood frame. Five pitching machines in room, three with brick furnaces built in ground, one with steel furnace, and one with furnace outside building. Room contained several hundred empty pitch-lined kegs at time of fire. Wash-house communicates with frame storage shed (sprinklered) on south, unprotected openings, and with three and four-story brick clip cellars (attic space only sprinklered) on north and west, with 4″ wood doors between, and with one, equal to two, story brick building (sprinklered) containing brine pumps and freezing tanks, protected by tin clad fire doors. Racking room (unsprinklered) 75x90′, wood floor and wall, built inside wash-house, with floor six feet above wash-house floor.

Wash-house equipment consists of 138 Grinnell and 102 Rockwood heads on two five-inch dry-pipe systems, Grinnell valves. Equipment not standard according to present rules, in that old pipe schedule is used and heads are not staggered. One automatic source water supply, gravity tanks of 100,000 gallons capacity; pressure 28.5 pounds per square inch on highest line in this building. Air on systems at time of fire; pressure of 40 pounds at last inspection.

Fire caused by pitch igniting, and communicating to pitch-saturated woodwork and roof with rapidity that men doing repair work

in vicinity barely escaped safely from the building. Alarm given before heads opened. Chief engineer who was on the ground and gave the alarm, stated that heads opened about one minute from time fire started, and within three minutes sprinklers had fire under complete control. Three streams of hose used to extinguish one or two small blazes which sprinklers undoubtedly would have put out.

Number of heads opened 118, all Grinnell on one five-inch system.

Charred condition of woodwork indicates that fire actually took hold over an area approximating 700 square feet.

Superintendent who observed action of the sprinklers, stated that sprinkler heads around outside of the fire area opened first, which was probably due to the fact that heads above pitching machines, where fire originated, were coated with pitch from pitch-laden vapors that constantly rise in the process.

7025. Winchendon, Mass. March 19, 1908. Toy Factory. There are two embossing machines in this room heated by naphtha torches similar to a plumber's torch. The torches were made in Winchendon by local people. Pressure is pumped up and naphtha is vaporized at the burner. Man was engaged in pumping up pressure when tank split and naphtha was thrown out into room. It immediately caught fire. It would have been a bad fire had not 15 sprinklers opened and held it. There was no gauge on the naphtha torch, so there was no means of knowing how much pressure had been pumped up. Sprinklers practically extinguished the fire.

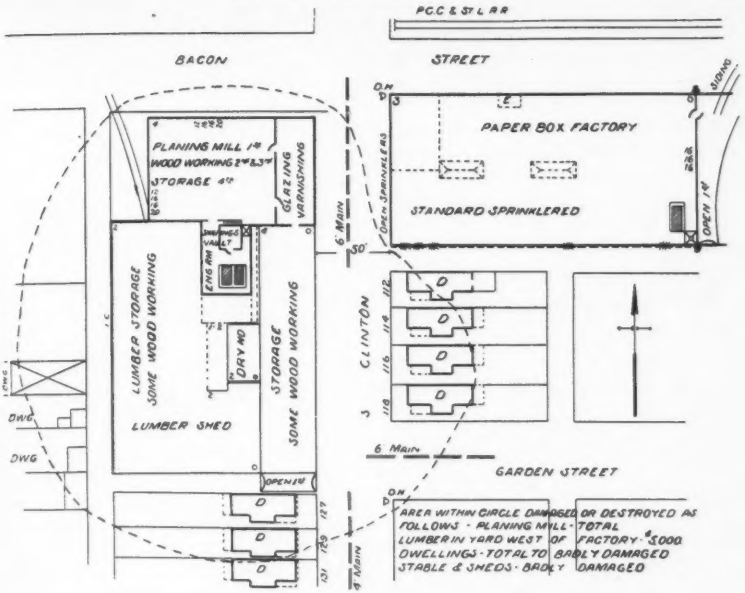
7060. Newark, N. J. April 17, 1908. Manufacturing Patent Leather. Fire occurred in one-story brick japan shop used for daubing and drying. Employee was washing daub brush in a pail of naphtha when the brush ignited. Seventeen sprinklers opened and held the fire in check.

7034. Dayton, Ohio. May 22, 1908. Paper Box Factory. A paper box manufactory which is located east across a narrow street is protected with a standard sprinkler equipment with open sprinklers at all windows on front of building toward the exposure. These were put into service promptly by their watchman and did excellent work in keeping flames out of building. Two of the open sprinklers were found to be clogged and inoperative, and it was necessary to bring two hose streams and a number of chemical extinguishers into play to extinguish flames at these points, also at alley windows on southwest end which were not protected with sprinklers, also on large overhanging cornice on south side and frame glass sided lanterns on roof.

Wood cornice is quite badly burned in places and one end and a portion of the side is burned out of lantern, a number of window frames are badly burned and nearly all window glass broken from excessive heat.

No inside sprinklers opened but there was undoubtedly sufficient heat at points where flames broke through to have opened numerous heads but were probably cooled by spray from hose streams used.

Siamese steamer connection which serves inside and outside sprinklers was not used.



Sprinkler Fire No. 7034.

The water supply at this part of the city is not very rugged and as soon as flames were under control (three hours) the outside sprinklers were shut off to furnish better supply to engines.

On the whole the protection afforded from these outside sprinklers was very commendable, creating as they did an almost effective fire stop; in fact were it not for these outside sprinklers, together with the two hose streams from the outside this building which is part of a long manufacturing row would have undoubtedly been destroyed and a conflagration of a considerable magnitude ensued.

This fire shows the need of frequent testing of outside sprinklers to ensure reliable operation.

7556. Chicago, Ill. May 24, 1908. Box Factory. Fire was discovered May 24, 1908, in the southeast corner of the lumber yard surrounding the main brick factory sections of the plant by a watchman, who turned in the alarm at 1.25 p. m., by district telegraph manual, and called the private department which consisted of three watchmen, two firemen and engineer.

The local apparatus consisted of one 1,000 gallon National Standard fire pump, one 500 gallon general service pump connected to the sprinkler equipment in the box factory and to 8-inch cast-iron underground main having three 3-way hydrants in remote parts of yard and 1,200 feet of 2½-inch National Standard fire hose distributed in hose houses at hydrants, water barrels and pails, chemical extinguishers where necessary, also a

local alarm and sprinkler equipment in the box factory. The underground water mains were installed by the firm and covered before being tested later by the Chicago Board of Underwriters, April 22, 1908, and found apparently satisfactory, but about a week previous to the fire the main began to leak badly at the southeast hydrant, due to lack of strapping at the lead joint. Repairs were begun but not finished when the fire occurred and hydrant main was therefore useless.

When the alarm was turned in, the private department attached hose leads to the wall hydrants at the pump room located in the north end of yard but owing to the rapidity with which the fire spread they were unable to control it.

The fire traveled northwest towards the box factory through open frame sheds containing box lumber and subsided only when it had burned out all the frame section.

The box factory which was most severely exposed was two-story brick mill construction, with standard parapets, wired glass metal frame windows and iron doors communicating west, and exposed 25 feet across alleys to the frame sheds south and east.

During the fire the several automatic windows in the box factory which were open closed and locked, but owing to the large quantity of cut lumber and boxes which was piled close to the windows and the intense radiation, this lumber began to char and it was necessary to open 17 sprinkler heads along the south wall in the second floor. The wired glass windows proved efficient with the aid of the sprinklers, but it is certain that they would have failed otherwise as the lumber was charred ¼-inch to ⅜-inch deep.

A one-story brick oil house having shutter protected openings adjoining the south lumber shed and exposed to the severest fire, preserved its contents.

The intake well and screen box at the river dock for the 1,000 gallon pump, had wooden covers which burned and fell into the water. These pieces of charcoal were sucked to the pump and forced into the sprinkler pipes, clogging several lines and making it necessary to clean out the entire equipment of piping after the fire, when pieces of pump valves, tow and a considerable quantity of cinders and charcoal was taken from the system.

Summary.

The sprinkler equipment in the box factory succeeded in preventing the spread of fire to that building through the wired glass windows, which most certainly would have happened had this protection not been installed or used.

Failure to strap all lead joints at elbows and hydrants in underground mains is responsible for useless fire mains at a critical time.

Intake and screen well covers should have been constructed of noncombustible material when severely exposed, as in this case.

Highly combustible stock should not be piled close to wired glass windows which are severely exposed, or additional protection should be provided.

MISCELLANEOUS FIRES.

H-2798. Kansas City, Mo. A small motor and buffing machine for which it furnished power were attached to a post on third floor, the wires running to the motor coming up through an iron pipe which terminated six or eight feet below the motor, the vibration of the post had evidently worn the insulation off the wires where they came in contact with the end of the pipe. The fire was undoubtedly due to this condition.

H-2772. Portsmouth, Va. January 28, 1908. Fertilizer Factory. Fire occurred in frame room occupied for bagging pulverized sole leather, fire spreading to storage room. This risk was used for receiving and preparing nitrogenous materials such as leather, hair, wool, horn shavings, etc., for incorporation in fertilizers. Scrap sole leather first cooked by steam, then roasted in cylinder revolving slowly at an angle of about 20 degrees over furnace, and falling out at open end into wheelbarrows, is then dumped and spread out in cooling shed. When cold the material is transferred to small frame room containing a pulverizing mill which consists of 36 hammers revolving at a speed of about 1,500 revolutions per minute, and striking towards a bed of 45 knives with only ¼″ clearance. The pulverized material is drawn off by fan having a speed of from 500 to 600 revolutions per minute, and carried by metal conduit to bagging room. After the explosion and fire, (which however did not involve the mill room) a piece of round ½″ steel about 3″ long was found in the mill, and this had evidently produced the explosion, although the bagging room where the explosion occurred was about 30′ from the mill room.

Introduction of magnet in mill might improve risk by removing iron nails, etc., but this would not eliminate other extraneous metallic and non-metallic matter which is likely to be present on account of the crude method of handling the raw stock.

H-2752. Providence, R. I. February 12, 1908. Starch Factory. This risk consisted of a brick building three and one-half stories in height, about 75x50′ divided into two sections, with a two-story addition about 75x30′ divided into two sections and cut off from the main building.

Communications between sections were protected by tin-clad fire doors. The risk had rather heavy joisted floors and roofs. The immediate neighborhood was quite thickly built up with buildings of a similar nature, but this risk was accessible from all sides.

It was occupied by this assured for the manufacture of dextrine from raw vegetable starch, processes being grinding, bolting, drying by fire heat in brick furnaces, and packing.

The first floor of one of the sections was occupied for a small stock of ship supplies, which included rosin, kerosene oil and turpentine.

About four o'clock in the afternoon two explosions occurred, a few minutes apart, and fire followed which resulted in the almost total loss of the property, and the death of seven people. The exact sequence of events is not known, but the following account is gathered

from the stories of the people in the neighborhood, several people who escaped from the building, and from the firemen who were on duty in the fire station which is nearby.

The first explosion occurred apparently in the premises of the ship supply company. This was severe enough to damage that portion of the building somewhat, and to break windows and cause a panic in the immediate neighborhood. It knocked in the large doors of the fire station, blocking the apparatus so that it could not be gotten out immediately, and injuring one of the firemen. Apparently several minutes elapsed when there was a second explosion which seemed to be in the second floor of the building, being the portion of the premises occupied by the starch factory. This was undoubtedly a dust explosion, and this is the explosion which did most of the damage to the building. It practically demolished the building from the level of the second floor and was immediately succeeded by a fierce fire. The steam boiler was removed from the ruins intact. The fires in the furnaces under the starch driers were banked at the time of the explosion, and the only operation going on in the starch factory was that of packing.

Presumably, the first explosion occurred among some of the inflammable fluids among the ship supply stock, and shook the whole premises sufficiently to impregnate the air in the building with starch dust. The fire very quickly reached the rooms where this condition of affairs existed, causing the second explosion.

H-2674. Hadley, Mass. April 8, 1908. Car House. The car house took fire at about 11.05 a. m., on April 8th and probably originated from spontaneous combustion of oily waste or possibly from steam pipes in contact with combustible material. The building was totally destroyed and cars badly damaged. The loss has not as yet been adjusted.

The building was of frame and averaged 105′ in length by 60′ in breadth. It was of light joist construction having composition roof, same being supported on posts. About one-half of the car house had a plank floor on sleepers, the balance being dirt. The building was divided lengthwise into two sections by a frame partition, one section being used for operating and the other section for storage. In the storage section were three tracks with a pit under each track, these pits being constructed with plank sides and plank floor. The pits were not connected although there was a space in one pit underneath the floor at end. There was no wiring in pits. The building was heated by steam from power stations about 89′ distant, and was lighted by electricity, it being claimed by the superintendent that this wiring had just been done over.

The operating section was used for minor repairs to cars, such as the replacing of brake shoes, changing of armature, trucks, etc., but no armature winding or painting was done here.

For internal protection there were sand pails and extinguishers. A standpipe had been provided, and it is said that the hose for same was on the way, but at the time of the fire there was no small hose in the building. The external protection was poor consisting of one

two-pipe hydrant about 100′ from building, said hydrant being supplied by a 4″ main with a static pressure of about 80 pounds.

At the time the fire originated there was one man in the car house, he being at work in the operating side about two thirds of the way down from the front of the barn. He states that he first saw a little blaze in the rear end of the pit under track nearest the middle of the barn, and this fire was apparently under the steps leading into the pits. He thought that he could easily put it out with a pail of water, but when he threw the water on the fire he states that the fire apparently spread and so quickly that his hair was somewhat singed. He then ran to the power house, a distance of about 89′, and summoned the engineer.

They tried to pull a dead car out of the storage section by means of a box car which was standing on the track in front of the car house, but claim that just about the time they got the car hitched to the dead car there was a hot air explosion, the doors at the front of the barn blowing out and at about this same time the trolley wire in the car house fell and blew the breaker in the power house, thus cutting off all current.

There were in the car house three ten-bench cars not equipped, one 15-bench car equipped, one 13-bench car equipped, one 13-bench car not equipped, and one single truck plow equipped, one single truck plow unequipped; also one 18′ box car outside which was only partially burned.

This I believe is the first car house to burn in New England where fire is definitely known to have originated in the pit. With the apparatus which the employee had to extinguish this fire and the fact that there were no cars in this section of the house, it seems funny that he was not able to stop the fire instead of allowing it to obtain such a start. The foreman of the barn is said to have worked on a car but not under it, located just over where this fire started, some ten minutes before the fire was discovered.

H-2735. Memphis, Tenn. May 20, 1908. Grain Elevator. The fire doors protecting division wall openings between elevator and warehouse were closed and the department upon arriving at the scene opened these doors but owing to the small size of floor opening into basement were unable to get at the fire which spread with great rapidity, soon driving the firemen back from the division wall openings into the warehouse, following them so rapidly that the fire ignited hay in the warehouse before the flames melted the door links, however this point is immaterial as the fire was so hot that it would have undoubtedly set fire to the warehouse building over its roof.

H-2971. Cleveland, Ohio. June 1, 1908. Theater. Fire occurred over the auditorium. It evidently started near or at an electric motor connected by belt to a five-foot fan for ventilating. Fire was discovered shortly after the second act of a vaudeville performance, the theatre being full of people. The fire department confined the fire to the attic. A good proscenium wall prevented fire from communicating to stage section. The attic space was from six to ten feet in height, of ordinary wood joist construction. The electrical equipment was approved and was supposed to

have been installed in accordance with the code but the fire brought out the need of the following changes. Remove wooden ducts and substitute metal ones. Electric motors to be enclosed in fire-proof enclosures properly ventilated.

It is evident that too much care cannot be exercised in looking carefully after all hazards in theaters. In this case the audience was quietly and quickly gotten out of the building with no mishaps.

Theaters should be constructed entirely of fire-proof material.

H-2970. Pawtucket, R. I. June 19, 1908. Lace Works. Fire occurred in a 172-inch lace machine, and ran the length of the machine destroying all the threads thereon.

The fire was caused as follows: In operating these machines, it is necessary to have lights at several points, each machine having five or six incandescent lights on cords. Each lamp is covered with a wire guard. On some of the lamps these guards touch the base of the lamp, and the two lights involved in this fire were in this condition. The base of these two lamps were of opposite polarity. One of them was laying on one end of the machine and lighted. One of the workmen lighted the other lamp, and touched the wire guard to the machine at a point where the warp threads come up through the deck. This caused a short circuit, which blew the fuse, and the flame set fire to the cotton threads.

We have recommended a type of socket which will eliminate this danger in the future.

Notes and Tables.

AUTOMOBILE GARAGES.

To Subscribers, Insurance Companies:

For some time we have been endeavoring to improve the conditions in the automobile garages in this city, results in general having proved unsatisfactory. The management of the larger number of these concerns appear to ignore almost entirely the serious fire hazards well known to exist in risks of this nature. Our experience shows that improvements are made from time to time but that it is only a question of a few weeks until most all proper practices are violated. The unsatisfactory conditions generally found have led us to make a special visit to all of the 43 public garages in Cleveland.

Careful observation of our reports shows the serious and hazardous existing conditions found in these risks, and if this is a specimen of the automobile garage risk as found the country over, it is our opinion that immediate and strenuous steps should be taken generally towards at least eliminating many of the most hazardous features found to exist in this class of fire risks.

The public automobile garage, as a usual thing, is located in a built-up district exposing other valuable property; gasolene is handled in enormous quantities, and with little regard of its real danger to loss of life and property; car storage capacity ranges anywhere from 10 to 300 automobiles; the gasolene supply tank capacity of each machine ranging from 5 to 20 gallons—this aside from the gasolene supply tank and filling hazard of the garage; machine and repair work, cleaning, handling of carbide and kerosene, electric charging apparatus, defective electric installation, acetylene gas charging, open forges, open gas lights and stoves, gasolene brazers and globe torches, soldering, the oily waste and grease hazard, oil-soaked condition of floors, poor means for the removal of highly inflammable refuse, operating cars in the garages, permitting pilot light of steam cars to remain burning, operating day and night, the presence of sub-occupancies for trimming, upholstering, vulcanizing, etc., inadequate fire protection, exposures, and the general disregard of proper maintenance and cleanliness, nearly all of the forenamed hazards summed up being an illustration of the average city garage as now generally found.

The public automobile garage is a good type of conflagration breeder, and while its existence is by no means a new one, yet it is our belief that it is time a more serious view of this hazard as now found in mercantile blocks representing large values in our large cities be taken.

An effort will at once be made to bring about improvements, and all possible help is solicited from our subscribers toward bringing about proper improvements in risks in which they may be more or less interested.

Cleveland Inspection Bureau,
C. H. PATTON, *Publisher.*

CELLULOID TESTS.

MATERIAL.—Celluloid plates, furnished by the Celluloid Company.

Yellow or amber, about	.174 in. thick.
Tortoise shell, about	.157 in. thick.
White, about	.145 in. thick.
Transparent sheets, about	.012 in. thick.

APPARATUS,—

Single wall tin oven, 5.5 inches diameter, 6 inches in height.

Iron wire gauze plate, 2 inches in diameter, suspended by three wires from top of oven, the plate being in centre of oven and about three inches above bottom.

A tin tube was secured in oven in a perpendicular position close to wire gauze plate, and extending to bottom of oven. This tube is ⅜ inch in diameter, open at bottom, and allowed the insertion of a thermometer, bulb resting upon bottom of oven.

Top or cover of oven was perforated by two holes, one for above thermometer, and one in center for a thermometer, the bulb resting upon wire gauze plate.

An opening, 1½ inches by 2 inches, was made in cover, and fitted with a loose tin cover, for relief.

Oven was heated by means of a small two-burner kerosene oil stove. The oven was supported upon a retort stand, about 1 inch above top of stove. Part of the tests were made with one burner in use, and part with two burners.

Material.	Approximate Weight. Grms.	Starting Temperature.	Decomposing Temperature.	Temperature at Bottom of Oven.	Result.	Time.	
Tortoise shell.	.4 grm.	80	308	420	Flame & Explosion.	8 min.	On wire gauze plate.
"	"	90	312	400	"	7 "	"
"	"	100	310	408	"	7 "	"
"	"	85	308	398	"	7 "	"
"	"	90	316	440	"	9 "	On porcelain crucible cover.
"	"	85	304	402	"	4 "	On wire gauze, 2 burners used.
Yellow.	"	70	318	396	"	8 "	On wire gauze.
"	"	90	320	410	"	7 "	"
"	"	80	316	398	"	8 "	"
"	"	85	318	408	"	8 "	"
"	"	70	320	406	"	11 "	"
"	"	90	318	418	"	6 "	"
"	"	80	320	432	"	7 "	"
"	"	90	320	440	"	6 "	"
"	"	90	318	414	"	6 "	"
"	"	80	320	424	Heavier.	3 "	2 burners used.
Tortoise shell.	"	100	335	450	No flame & Explosion	10 "	In small bottle, vent in cork.
"	"	85	336	454	"	9 "	In small bottle, no cork.
"	"	90	324	436	Fl. & Exp.	10 "	In small bottle, celluloid at open end.
Thin transparent.	.03	100	330	460	No flame.	12 "	In small bottle. corked tightly.
Tortoise shell.	.2	80	316	426	Fl. & Exp.	8 "	Wrapped in cardboard. Card browned on inside only.
"	.2	95	318	426	"	8 "	Wrapped in cardboard. Card browned on inside only.
"	.4	80	300	——	"	7 "	On wire gauze.
"	.4	90	310	420	"	8 "	"
White.	"	80	310	426	No Fl. or Exp.	8 "	"
"	"	70	310	432	"	9 "	"
"	"	80	304	418	"	6 "	"
"	"	85	308	432	"	7 "	"
"	"	80	312	432	"	8 "	"
Thin transparent.	"	80	280	380	Fl. & Exp.	5 "	"
"	"	100	314	436	"	9 "	"
"	"	80	304	412	"	7 "	"
"	"	80	288	390	"	6 "	"
"	"	80	274	380	"	5 "	"
"	"	100	274	360	Stopped and removed for examination.		

In the following experiments, the material was placed in a small tin box, 1⅜x2⅛ inches, and 1½ inches high, having a capacity of 70 c. c., and fitted with cover. This box was placed upon the wire gauze plate, the bulb of one thermometer resting upon the wire gauze plate, close to box.

Material.	Approximate Weight. Grms.	Starting Temperature Below	Decomposing Temperature Below	Temperature at Bottom of Oven.	Result.	Time.	
Thin transparent.	.08	100°	360°	——	No flame.	20 min.	Box covered.
5/8 x 1/2"	"	"	350	——	"	10 "	"
"	"	"	330	——	"	8 "	"
"	"	"	355	——	Fl. & Exp.	7 "	Box uncovered.
"	"	"	——	——	No flame.	6 "	Box half covered.
"	"	"	300	——	Fl. & Exp.	5 "	"
1/4 x 1/2"	.04	"	310	——	"	5 "	"
1/2 x 5/8"	.08	"	300	——	"	6 "	"
"		"	310	420	"	6 "	Box 3/4 covered.
1/4 x 5/8"		"	320	420	"	6 "	Box 7/8 covered.
1/8 x 5/8"		"	330	440	"	9 "	Box nearly covered.
1-16 x 5/8"		"	350	460	No flame.	10 "	"
1/8 x 5/8"		"	330	440	Fl. & Exp.	7 "	"
"		"	336	420	"	8 "	Box covered.
"		"	338	440	"	8 "	"
"		"	334	430	"	8 "	"
"		"	336	440	"	9 "	"
1/4 x 5/8"		"	340	438	No flame.	9 "	"
1-16 x 5/8"			330	430	Fl. & Exp. slight.	7 "	"
1/8 x 5/8"			318	420	Fl. & Exp.	6 "	"
1-16 x 5/8"			350	——	——	9 "	Unchanged when box was opened.
3-16 x 5/8"			320	440	Fl. & Exp.	7 "	Box covered.
"			336	440	"	9 "	"
1/4 x 5/8"			330	440	"	8 "	"
Tortoise shell.	.05	"	340	——	No flame.	9 "	"
"	"	"	328	420	Fl. & Exp.	6 "	"
"	.1	"	330	460	"	5 "	"
"	.2	"	340	455	No flame.	7 "	"
Thin transparent.					"	6 "	"
5/8 x 3"	.5	"	336	450			
5/8 x 1"	.16	"	340	456	"	7 "	"
5/8 x 1/2"	.08	"	332	430	"	6 "	"
5/8 x 3-16"	.03	"	340	450	Fl. & Exp.	7 "	"
Test of sample said to be celluloid about five years old.							
Tortoise shell.	.3	100°	302	400	No flame.	8 min.	On wire gauze.
"	.3	100	298	398	"	8 "	"
"	.3	90	298	410	"	6 "	"
Test of sample of another make.							
Tortoise shell.	.3	80	308	430	Fl. & Exp.	9 "	"
"	.3	100	301	440	No flame.	6 "	"
"	.3	80	306	414	"	10 "	"
Test of sample of soluble cotton.							
	.03	100	350	——	Fl. & Exp.	10 "	In covered box.
	.03	100	320	——	"	8 "	On wire gauze.

Range of explosive effects in covered box of 70 c. c. capacity, 1-16x5/8—.012 thick, weight, .01 to .04 grms., or ratios as regards volume of celluloid to capacity of box of 1 to 2,500 and 1 to 10,000.

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